

SAN JOAQUIN COUNTY

GENERAL PLAN 2010

VOLUME III: TECHNICAL APPENDICES

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VOLUME III - COUNTYWIDE GENERAL PLAN

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Variable	Unit	Mean	SD	Range
Age	Years	45.2	12.5	18-75
Gender	Male/Female	50.0/50.0		
Education	Years	12.8	2.1	8-18
Income	\$1000s	25.5	15.2	0-100
Marital Status	Married/Single	65.0/35.0		
Health Status	Good/Poor	70.0/30.0		
Employment	Employed/Unemployed	60.0/40.0		
Religion	Protestant/Catholic	40.0/60.0		
Political Affiliation	Democrat/Republican	55.0/45.0		
Attitude	Liberal/Conservative	50.0/50.0		

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Age	Years	45.2	12.5	18-75
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Source: Author's calculations based on data from the 1980 Census of the United States.

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Variable	Mean	Standard deviation
Age	34.5	10.2
Gender	1.2	0.4
Marital status	1.5	0.5
Education	12.5	1.5
Income	15.2	3.5
Occupation	1.8	0.8
Health status	1.5	0.5
Smoking status	1.2	0.4
Alcohol consumption	1.5	0.5
Exercise frequency	1.2	0.4

TABLE 2. (continued)

Variable	Mean	Standard deviation
Age	34.5	10.2
Gender	1.2	0.4
Marital status	1.5	0.5
Education	12.5	1.5
Income	15.2	3.5
Occupation	1.8	0.8
Health status	1.5	0.5
Smoking status	1.2	0.4
Alcohol consumption	1.5	0.5
Exercise frequency	1.2	0.4

TABLE 3. (continued)

Variable	Mean	Standard deviation
Age	34.5	10.2
Gender	1.2	0.4
Marital status	1.5	0.5
Education	12.5	1.5
Income	15.2	3.5
Occupation	1.8	0.8
Health status	1.5	0.5
Smoking status	1.2	0.4
Alcohol consumption	1.5	0.5
Exercise frequency	1.2	0.4

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Variable	Mean	Standard deviation
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**SAN JOAQUIN COUNTY
GENERAL PLAN 2010**

This is Volume III of the San Joaquin County General Plan 2010. It includes the Technical Appendices, which are background reports on the various subjects addressed in the General Plan. The other portions of the General Plan, which are each separately bound, are:

- o Volume I, which contains the Goals and Implementation Actions, and the Countywide General Plan 2010 Map; and
- o Volume II, which contains individual policies and General Plan 2010 Maps for each community in the County.

The Constitution of the United States is a document of great importance. It is the foundation of our government and the source of our rights. It is a document that has been amended many times, but its basic principles remain the same.

The Constitution is a document that is often misunderstood. It is not a set of rules that govern the government, but a set of principles that guide the government.

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FIGURE I-1:

RELATIONSHIP OF GENERAL PLAN VOLUME III SECTIONS TO STATE MANDATED ELEMENTS

CHAPTER	SECTION	APPLICABLE STATE ELEMENT
POPULATION, HOUSING AND EMPLOYMENT	Existing and Future Population Projections Existing and Future Housing Projections Existing and Future Employment Projections Jobs-Housing Ratio	Land Use, Housing Land Use, Housing Land Use, Housing Land Use, Housing
COMMUNITY DEVELOPMENT	Land Use Development Housing Transportation Utilities Public Facilities	Land Use Housing Circulation Land Use, Circulation Land Use, Open Space
PUBLIC HEALTH AND SAFETY	Seismic and Geologic Hazards Flood Hazards Fire Safety and Law Enforcement Noise Hazardous Materials and Wastes Emergency Preparedness	Open Space, Safety Land Use, Safety, Open Space, Conservation Safety Noise Safety Safety
RESOURCES	Open Space Agricultural Lands Extractive Resources Energy Air Quality Water Resources and Quality Vegetation, Fish and Wildlife Habitat Heritage Resources Summary of Open Space Plan	Open Space, Conservation Open Space, Conservation Land Use Open Space, Conservation Open Space Open Space Open Space, Conservation Open Space, Conservation Open Space Open Space

A. INTRODUCTION

1. USE OF PROJECTIONS

One of the first tasks in planning for the future of any community is to understand the dynamics of growth affecting the jurisdiction. Growth is a function not only of a community's own economic and social conditions but also of conditions in the larger region. In San Joaquin County, development pressures result from changes in the local economy (e.g., diversification of the manufacturing base and expansion of the service economy), as well as economic and social changes in the San Francisco Bay Area, the Sacramento Metropolitan Area, and the Modesto area.

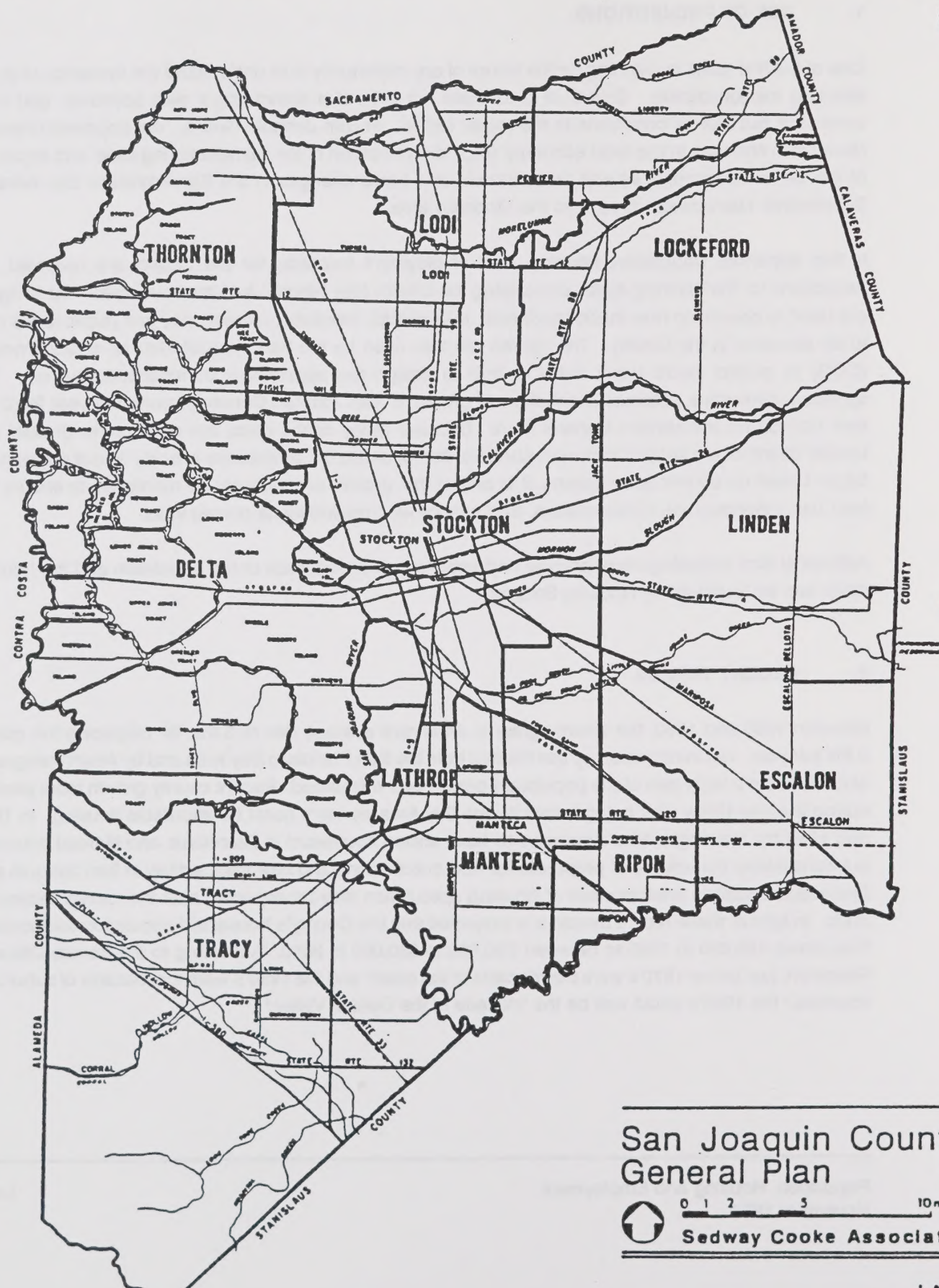
In this appendix, population, housing, and employment forecasts for the County are reviewed, and projections for the Planning Areas comprising the County (see Figure I.A-1) are developed. These figures are used to determine how much residential, commercial, industrial, recreational, and public lands need to be allocated in the County. The figures are also used by the San Joaquin Council of Governments (COG) to project future travel demand and to design the appropriate transportation system. This appendix presents a potential distribution of growth in San Joaquin County through the year 2010, the time horizon for the revised General Plan. Because many of the cities are undergoing general plan update efforts or are subject to growth controls, and because the projections are only a best guess of the future based on current assumptions, it is critical that growth continuously be monitored to ensure that land use, infrastructure, transportation, and service recommendations remain valid.

Additional data regarding demographic and economic characteristics of the population and the housing stock can be found in the Housing Section.

2. RECENT TRENDS

Between 1980 and 1990, the County grew at an annual average rate of 3.8%, far outpacing the state's 2.6% per year. Net in-migration by commuters from the San Francisco Bay Area and by Asian immigrants accounted for a large part of the population growth over this period. Recent county growth rates peaked during the mid-1980s after being fueled by the Bay Area worker's quest for affordable housing. In 1989 and 1990 the housing market appeared to have shifted southward to Stanislaus and Merced counties, but considering the volume of proposals for new subdivisions and new town activity in San Joaquin and Stanislaus Counties, another wave of housing speculation may be expected after the current recession ends. In light of these recent trends, it is projected that the County's household population will increase from about 465,000 in 1990 to between 750,000 to 830,000 in 2010. According to the Senate Office of Research, just as the 1970's were the "decade of the coast" and the 1980's were the "decade of suburban counties," the 1990's could well be the "decade of the Central Valley."

1.A-2



Economic development is contingent upon a number of factors ranging from availability of raw resources, transportation access, labor force, public services and utilities, environmentally unconstrained land, and receptive political and business environment. Economic growth in the County has been especially strong in the manufacturing, retail trade, and service sectors. By contrast, agricultural employment has shown a steady decline due to foreign competition, new technology, and federal farm policy. Over the 1975-89 period, the County lost about 4,600 jobs in agricultural production and services. These trends, particularly in the agricultural industries, are likely to continue, provided essential public services can be made available.

3. DISTRIBUTION OF GROWTH

Although San Joaquin County has an extensive supply of developable land throughout the County, growth is most likely to concentrate in the southern part of the County, in Stockton, and along the Interstate 5 corridor in response to increasing housing demand from the Bay Area and Sacramento. In addition, new urban development is most likely to occur, and should be encouraged, in and adjacent to existing urban communities. The reasons for this are two-fold. First, existing urban communities are better able to provide the necessary public services to serve new development efficiently and cost effectively. Second, maintaining new development in and around existing development serves to minimize urban sprawl and to limit encroachment onto the County's valuable agricultural soils.

It is assumed that the County's rural communities will not experience much growth because of:

- o their isolated locations,
- o the desire of residents to retain their small communities,
- o the need to minimize urban encroachment onto valuable, prime agricultural lands,
- o limited infrastructure, and
- o the desire to minimize urban sprawl by concentrating new urban development around existing urban communities.

FIGURE LA-1 SAN JOAQUIN COUNTY PLANNING AREA

San Joaquin County is a large agricultural county located in the central part of the state. It is one of the most fertile counties in the state and is known for its production of grapes, almonds, and other fruits. The county is also home to a large population of people who work in the agricultural industry. The county is divided into several planning areas, each of which has its own set of goals and objectives. The planning areas are: Central Valley, Delta, and the Sacramento-San Joaquin River Delta. Each planning area has a different set of challenges and opportunities, and the county is working to address these challenges and opportunities in a coordinated way.



San Joaquin County

Central Valley

Delta

Sacramento-San Joaquin River Delta

San Joaquin County Planning Area

B. EXISTING AND FUTURE POPULATION PROJECTIONS

1. CURRENT ESTIMATES

Historical data are presented in Table I.B-1 to provide a sense of how population has grown in the County. During the 1970's, the County's growth rate was comparable to that of the state's. In contrast, the County has grown at a substantially faster pace, compared to the state, during the 1980's. In 1990, total County population was about 480,600. The 1980's show higher growth rates than in the 1970's for all cities in the County. Additionally, the growth rates have been higher in the cities than in the unincorporated portions of the County.

Table I.B-2 shows the 1990 population for the incorporated and unincorporated areas by Planning Area. Approximately 75% of the County's household population resides in the cities, and of this number, almost 60% are in Stockton. The unincorporated population of 115,000 is concentrated in the Stockton, Lodi, Manteca, Tracy, and Lockeford Planning Areas.

TABLE I.B-1: POPULATION GROWTH, CALIFORNIA AND SAN JOAQUIN COUNTY, 1970-1990

	Census			Annual Average Percentage Change	
	1970	1980	1990	1970-1980	1980-1990
California	20,009,000	23,667,900	29,760,021	1.8	2.6
San Joaquin	291,073	347,342	480,628	1.9	3.8
Unincorporated Areas	118,805	112,353	124,747	-0.5	1.1
Incorporated Cities	172,268	234,989	355,881	3.6	5.1
Escalon	2,366	3,127	4,437	3.2	4.2
Lathrop	—	—	6,841	—	—
Lodi	28,691	35,221	51,874	2.3	4.7
Manteca/ Lathrop	13,845	24,925	40,773	8.0	*
Ripon	2,679	3,509	7,455	3.1	11.2
Stockton	109,963	149,779	210,943	3.6	4.1
Tracy	14,724	18,428	33,558	2.5	8.2

Source: 1970, 1980, 1990 U.S. Census; San Joaquin County Planning Division.

* Pre-1990 population figures contained the now incorporated city of Lathrop.

2. POPULATION PROJECTIONS

Table I.B-2 also shows the projected population for each Planning Area for the year 2010. The forecasts were developed based on a review of city documents, including general plans and traffic studies; interviews with city and County staff; the policies of Volume I and II of this General Plan; and assumptions described below.

Stockton. Because Stockton is the County's largest metropolitan center and has the most extensive land supply, it was assumed that it would absorb the bulk of the County's growth through the year 2010. The population figure for the year 2010 was drawn from the 1991 general plan revision effort and from recent infrastructure and public facility plans. Virtually all of the growth in this Planning Area was assumed to occur within the city, either by infill or by annexation of undeveloped unincorporated areas, especially to the north and to the northeast. Major development projects, including Spanos Park, La Morada, Brookside, Weston Ranch, and Harbor Cove, are acknowledged. Growth will also occur in existing and expanded unincorporated communities, such as Morada and French Camp.

Delta. Conditions in the Delta have not changed significantly since the early 1980's, and there are serious constraints to growth including flood hazards, soil limitations, and poor access. Accordingly, the low level of building permit activity that occurred between 1970 and 1990 is likely to continue in the future.

Thornton. The lack of public wastewater treatment presents major constraints to substantial development in the Thornton community. In addition, much of the area is in the 100-year floodplain and has prime agricultural soils. With the provision of the necessary public services, the community could grow. Without them, future development would be limited to infill of existing vacant parcels.

Lodi. It was assumed that the rate of growth for the city of Lodi would be less than that projected for the County as a whole. Population growth in Woodbridge would increase only slightly due to infrastructure constraints and the lack of designated growth areas. In the area's rural communities (Acampo, Cooper's Corner, Victor, and Collierville), growth would be slight or inconsequential, consistent with the Plan's policy of very limited expansion of some rural communities and no expansion of most of the others.

Linden. Growth in the farming communities of Linden, Farmington, and Peters is expected to be minimal from a County perspective, but can be considered substantial from a local perspective. The population of Linden community will increase threefold and Peters community is expected to almost double in size. The Planning Area's average annual growth rate of less than 3% would be less than the overall Countywide growth rate of 4%.

TABLE I.B-2: HOUSEHOLD POPULATION CHANGE BY PLANNING AREA

1990 POPULATION			2010 POPULATION			
<u>Planning Area</u>	<u>Total</u>	<u>% of County</u>	<u>Total</u>	<u>% of County</u>	<u>Net Increase 1990-2010</u>	<u>% Increase</u>
Stockton	263,500	56.7	380,200	47.1	116,700	44.3
Delta	1,600	0.3	1,500	0.2	- 100	- .6
Thornton	2,500	0.5	2,400	0.3	- 100	- 4.0
Lodi	64,500	13.9	85,200	10.5	20,700	32.1
Linden	4,300	.9	6,700	0.8	2,400	55.8
Lockeford	9,000	1.9	10,900	1.3	1,900	21.1
Escalon	9,800	2.1	13,800	1.7	4,000	40.0
Ripon	10,000	2.2	15,700	1.9	5,700	57.0
Manteca	49,700	10.7	89,500	11.1	39,800	80.1
Lathrop	7,800	1.7	29,100	3.6	21,300	273.1
Tracy	42,400	9.1	175,000	21.7	132,600	312.7
Total	465,100	100.0	808,000	100.0	344,900	74.2

Source: 1990 U.S. Census; San Joaquin County Planning Division.

Note: For planning purposes, San Joaquin County is using a 2010 population projection range of 750,000 to 830,000.

Lockeford. Most of the growth projected for the Lockeford Planning Area would occur in the urban community of Lockeford. The other community in the Planning Area, Clements, suffers from a lack of public services.

Escalon. The city of Escalon's forecasted population growth is based on the city's estimate of about 75 dwelling units per year and assuming the City's wastewater treatment plant holding capacity is adequate.

Ripon. Current commitments, including signed development agreements, indicate that Ripon probably will grow about 5% per year for the next five years. The figures from the city's 1988 General Plan indicate a 2010 population of over 15,900 (although the County forecasts the 2010 city population closer to 14,000).

Manteca. As part of its current General Plan, the city has estimated a year 2010 population of about 80,000, based primarily on infrastructure capacity. The forecast is for the city's primary urban service area. The unincorporated portion of this Planning Area is expected to increase only slightly. The Planning Areas average annual growth will be the same as the overall Countywide growth rate of 4%.

Lathrop. This is a new Planning Area, almost coterminous with Census Tract 51.01. It was formerly a part of the Manteca Planning Area. The development potential is considerable for the city of Lathrop, given the large amount of land to become developable on the west side of the freeway. Once public services are available, this area can expect to grow rapidly. The County is forecasting slightly over a 29,000 population for this Planning area by 2010.

Tracy. Tracy recently approved a residential Specific Plan for approximately 7,500 units on 2,000 acres in the south and west areas of the city. This growth potential was included in the I-205 study which also projected development potential in currently unincorporated areas to the west and north. The year 2010 forecast of 96,000 for the city represents proposed new growth and does not include annexation of developed unincorporated lands. The Tracy Planning Area is assumed to grow faster than the Countywide rate because of the area's proximity to the San Francisco Bay Area and the rapidly developing Tri-Valley area. In addition, the proposed new communities of New Jerusalem and Mountain House are located in this Planning Area. These communities are assumed to increase area population totals by over 65,000.

Conclusions. The County's household population is projected to increase by 344,900 persons between 1990 and 2010. This represents a 75.9% increase over the current 1990 population of 465,100 persons. The year 2010 growth scenario of 75.9% represents a strong bias towards assigning growth to the incorporated cities in the County, particularly Stockton, Tracy, and Manteca. This shift in population is consistent with the County's policy of encouraging development to locate in existing communities.

The Stockton Planning Area will continue to accommodate the largest number of residents, approximately half of the County's population. After the Stockton Planning area, the Tracy, Manteca, Lathrop, and Lodi Planning Areas are expected to experience the bulk of future population growth increases.

C. EXISTING AND FUTURE HOUSING PROJECTIONS

1. CURRENT ESTIMATES

This portion of the chapter presents housing unit estimates, as well as some projections to accommodate the projected population. The Housing Chapter contains more detailed information regarding the current housing stock, and the housing required by the County to meet its fair share of the regional demand.

In 1990, the County's household population of 465,100 persons was housed in 158,156 dwelling units. In addition, another 15,576 persons were housed in group quarters. Of the County's housing stock, approximately 70% are single family dwelling units, 8% are in structures with 2-4 units, 15% are in structures with five or more units, and 5% are mobile homes. Ninety-six percent of the multiple dwelling unit structures are found in the cities. Table I.C-1 shows the distribution of housing units among the various cities and unincorporated areas. The City of Stockton accounts for about 44 percent of the County's entire housing stock; the County is the next largest provider with 25 percent of the dwelling units. Table I.C-2 shows the distribution of housing units by Planning Areas.

**TABLE 1.C-1:
1990 HOUSING UNITS BY TYPE**

CITY	SINGLE	2 to 4	5 or MORE	MOBILE HOMES	Other	TOTAL	OCCUPIED	PERCENT VACANT
Escalon	1,272	99	107	144	18	1,640	1,596	2.68
Lathrop	1,636	98	4	289	13	2,040	1,927	5.54
Lodi	12,999	1,872	4,080	499	226	19,676	19,001	3.43
Manteca	10,015	1,186	2,052	652	76	13,981	13,440	3.89
Ripon	2,163	166	225	3	10	2,567	5,033	3.93
Stockton	44,871	8,489	16,943	1,329	893	72,525	68,794	5.14
Tracy	9,198	929	1,483	445	119	12,174	11,208	7.93
TOTAL INCORPORATED	82,154	12,839	24,894	3,361	1355	124,603	120,999	2.89
UNINCORPORATED	34,386	832	582	5,410	451	41,671	37,157	10.83
TOTAL COUNTY	116,540	13,671	25,486	8,771	1806	166,274*	158,156	4.88
Source: California Department of Finance; San Joaquin County Planning.								
* U.S. Census for dwelling units is 166,340								

**TABLE LC-2:
1990 HOUSING UNITS, HOUSEHOLD POPULATION, AND PERSONS PER DWELLING UNIT
BY PLANNING AREA**

<u>Planning Area</u>	<u>1990 Household Population</u>	<u>Total Dwelling Units*</u>	<u>Persons Per Dwelling Unit</u>
Stockton	263,500	93,700	2.81
Delta	1,600	600	2.67
Thornton	2,500	1,000	2.50
Lodi	64,500	24,800	2.60
Linden	4,300	1,400	3.10
Lockeford	9,000	3,200	2.81
Escalon	9,800	3,400	2.88
Ripon	10,000	3,500	2.86
Manteca	49,700	17,000	2.92
Lathrop	7,800	2,400	3.25
Tracy	42,400	15,400	2.75
Total	465,100	166,300	2.80

* Rounded to the nearest hundred.

Source: 1990 U.S. Census; San Joaquin County Planning Division

During the 1970's, housing stock increased by about 40,000 units. According to the COG, this increase served primarily to meet pent-up demand among existing residents. As a result, housing development occurred at almost twice the rate of population growth over this period. Since 1980, the rate of construction has declined, even though 60% of the County's building permit valuation is in residential permits, compared to 51% statewide. Manteca's and Tracy's shares of new housing construction have grown substantially since the 1970's in response to the number of Bay Area commuters that have sought more affordable housing in San Joaquin County. Estimates prepared as part of Tracy's I-205 Corridor study indicate that overflow housing demand from the Tri-Valley area could account for approximately 70% of the population growth projected for Tracy through the year 2000.

2. HOUSING PROJECTIONS

Future projections of housing demand are a function of the projected population growth, the average household size, and housing costs. For example, if the average household size was 2.81 persons, the figure projected by DOF for the year 2010, the County would need to have 288,400 dwelling units to house the projected year 2010 household population of 808,000. If the household size were to decline

to about 2.71 persons, the number of housing units needed to accommodate the same growth forecast would be 298,900. The projected number of housing units under each of these household size assumptions is presented by Planning Area in Table I.C-3.

**TABLE I.C-3:
YEAR 2010 HOUSING DEMAND**

<u>Planning Area</u>	<u>2010 Population</u>	<u>HOUSING UNITS ASSUMING AVERAGE</u>	
		<u>Household Size of 2.81</u>	<u>Household Size of 2.71</u>
Stockton	380,200	135,300	140,300
Delta	1,500	500	600
Thornton	2,400	900	900
Lodi	85,200	30,300	31,400
Linden	6,700	2,400	2,500
Lockeford	10,900	3,900	4,000
Escalon	13,800	4,900	5,100
Ripon	15,700	5,600	5,800
Manteca	89,500	31,900	33,000
Lathrop	29,100	10,400	10,700
Tracy	175,000	62,300	64,600
Total	808,000	288,400	298,900

Source: San Joaquin County Planning Division

The Countywide distribution among single family, multiple family, and mobile homes is unlikely to change significantly between 1990 and 2010, although the percentage of multiple units is expected to increase slightly. Individual efforts by some of the cities may result in changes within Planning Areas, but it is not expected to affect the overall distribution. Lodi and Tracy, in particular, are expected to see at least 10% reductions in the share of single-family units, with an equivalent increase in the share of multiple units. The demand from the existing residents for "trade-ups" and from the Bay Area commuters will continue to be single family units. As the local economies develop, a broader variety of housing types, including multiple units, will be required to meet the housing demand.

D. EXISTING AND FUTURE EMPLOYMENT PROJECTIONS

1. CURRENT ESTIMATES

The total estimated annual average employment for San Joaquin County for the years 1975, 1980, 1985, and 1987, distributed by business sector, is presented in Table I.D-1. The employment figures are from the State Employment Development Department.

Employment growth in the County has been relatively steady over the past decade. In the early 1970's, agriculturally-related employment accounted for over 15% of the County's wage and salary employment, and 42% of the jobs in manufacturing were in food processing. Since then, the percentage of jobs in agriculture has declined, as have the share of manufacturing jobs in food processing. Offsetting these losses has been employment growth in finance, insurance, and real estate; fabricated metals; electronics; furniture and fixtures; and trucking, warehousing, and transportation. A recent study of San Joaquin County's economic conditions and growth identified four key sources of future growth:

- o Food processing will continue to be the largest manufacturing employer, experience diversification into other operations ranging from dairy to grain mill products, and undergo modernization;
- o Population pressures, high land prices, and lack of affordable housing in the San Francisco Bay Area will continue to create a demand for housing and business relocations in the County;
- o The County's locational advantages will continue to provide access to the markets of major metropolitan areas in northern and southern California, as well as to suppliers in the rest of the country;
- o Proximity and access to Pacific Rim influences will bring population and a growing number of foreign investors.

These forces will also continue to affect the labor force in the County. In the past, the County has had unemployment levels substantially above those of the state's and average wages that are substantially below. In early 1991, unemployment in the County rose to 13.9%, compared to 7.4% for the state and 6.5% for the Country. Despite a shift away from its agricultural base and expansion of the industrial job base, the County continues to lag behind the state in income and employment. Two recent trends will affect how well the County does with regard to these economic conditions in the future. On one hand, the introduction of ever greater numbers of commuters and of service and industrial jobs should raise the educational and income levels of the County's labor force. On the other hand, the increasing influx of southeast Asian immigrants may have a counter effect.

Employment in the County by sector is presented in Table I.D-1. The figures represent the number of wage earners and do not represent the entire labor force. The latter figure includes unemployed individuals, and is approximately 10% higher than the figures in Table I.D-1. Manufacturing, retail trade, services, and government comprise the largest employment sectors, which accounted for almost two-thirds of the County's estimated 178,800 employees in 1989.

TABLE I.D-1: SAN JOAQUIN COUNTY EMPLOYMENT BY SECTOR *						
Employment Sector	1975	1980	1985	1989	1975-85 Average Annual Growth	1980-89 Average Annual Growth
Retail Trade	16,700	20,300	23,600	36,600	4.1%	8.9%
Services	17,900	23,800	27,100	32,600	5.1%	4.1%
Office ¹	3,900	5,100	8,000	9,600	10.5%	9.8%
Manufacturing ²	29,900	33,700	34,200	39,600	1.4%	1.7%
Institutional ³	28,800	29,900	30,900	35,100	0.8%	1.9%
Agricultural ⁴	20,500	19,000	16,800	15,900	-1.8%	-1.8%
Other ⁵	3,800	5,700	7,500	9,400	9.7%	7.2%
TOTAL	121,500	137,500	148,100	178,800	2.2%	3.3%
¹ Includes finance, insurance and real estate. ² Includes manufacturing, wholesale and transportation. ³ Includes government, communication and utilities. ⁴ Includes agriculture and mining. ⁵ Includes all other categories. * Figures are for September of each of the years which reflects the peak employment figure for the year.						
Source: California Employment Development Department						

Agriculture. Agricultural production has been the traditional economic base of San Joaquin County. The County consistently ranks among the top counties in California for total gross farm receipts. In 1989, total gross value of farm production in San Joaquin County amounted to over \$871 million. This is a \$15 million increase from the \$856 million of 1988.

Employment in agriculture was one of the primary sources of jobs in the County. In 1975, agricultural employment was at its highest point with approximately 20,400 jobs, making it one of the single largest employment sectors. Since 1975, there has been a dramatic decline in agricultural jobs: agricultural employment fell 23% to approximately 15,900 in 1989.

The decline in demand for labor in agricultural production is in part due to changes in farming methods, production, and the use of new equipment. These changes have led to an overall reduction in farm land production in the County. Agricultural production acreage totaled approximately 578,756 acres in 1989. This is a substantial drop from 879,500 acres in 1975. Most of these conversions have occurred in the Planning Areas of Stockton, Lathrop, Tracy, Manteca, and Lodi. The areas least affected by the conversion of agricultural land to other uses are the Delta, Linden, Lockeford, and Thornton Planning Areas.

Retail, Service, and Manufacturing. San Joaquin County is strategically located in California's Central Valley. Because of its extensive transportation network and proximity to the San Francisco Bay Area, the County has developed into a major regional subcenter. The total number of workers in San Joaquin County increased from 121,500 in 1975 to 182,100 in 1990, a 50% increase. Over this fifteen-year period the County has had a steady growth in the retail, service, and manufacturing sectors. This type of growth reflects national economic trends. As Table I.D-1 indicates, service sector employment increased from 17,900 workers in 1975 to 32,600 workers in 1989. In 1989 retail trade and service sector jobs represented 38% of all jobs in the County. The emergence of retail, service, and manufacturing employment has helped to diversify the County's economic base. The diversity has resulted in a more stable economy and a decrease in the seasonal fluctuation of employment caused by agricultural production.

Retail trade which includes food stores, eating and drinking places, and miscellaneous stores, accounted for approximately 36,600 employees, representing an 119% increase in employment from 1975. Service, institutional, and finance, insurance and real estate employment represents approximately 77,300 jobs. Manufacturing jobs, which includes transportation and wholesale trade, accounts for approximately 39,600 jobs. Other employment categories, which include agriculture, construction, and mining, account for the remaining 25,300 jobs in the County.

Unemployment. Historically, San Joaquin County has had a consistently high unemployment rate. Currently the unemployment rate has been rising because of the recent recession following seven consecutive years of declining unemployment rates. The primary impetus behind the decline was the continued commercial and residential development which provided growth and diversification to the area's economy. With the end of the recession, the County's economy should continue to expand and diversify and the Employment Development Department estimates that this decline in unemployment will resume.

Average vs. peak employment. Peak employment is substantially higher than average employment, particularly in San Joaquin County, where agriculture and agricultural processing industries are large employers. The County Planning Division estimates that in 1990 the September (peak) employment was 182,100 (Table I.D-2).

TABLE I.D-2: PEAK EMPLOYMENT CHANGE BY PLANNING AREA, 1990-2010

<u>Planning Area</u>	<u>1990 Employment</u>	<u>% of County</u>	<u>2010 Employment¹</u>	<u>% of County</u>	<u>Net Increase 1990-2010</u>	<u>% Increase</u>
Stockton	105,600	58.0	153,100	50.9	47,500	44.9
Delta	2,800	1.5	3,300	1.1	500	17.9
Thomton	2,100	1.2	2,800	.9	700	33.3
Lodi	25,400	13.9	31,900	10.6	6,500	25.6
Linden	2,200	1.2	2,600	0.9	400	18.2
Lockeford	1,700	0.9	3,400	1.1	1,700	100.0
Escalon	2,800	1.5	4,600	1.5	1,800	64.3
Ripon	4,600	2.5	6,100	2.0	1,500	32.6
Manteca	14,300	7.9	24,600	8.2	10,300	72.0
Lathrop	5,300	2.9	16,600	5.5	11,300	211.3
Tracy	15,300	8.4	51,900	17.2	36,600	239.2
Total	182,100	100.0	301,000	100.0	118,800	65.2

¹ This includes employment projections from the two New Communities.

Source: 1990 U. S. Census; San Joaquin County Planning

Employment Corridors. The cities located on the major routes of I-5, I-205 and State Route 99 form the urban employment corridors in the County. The Lodi, Manteca, Stockton, and Tracy Planning Areas contain approximately about 88% of the County's employees in 1990, (see Table I.D-2).

Historically, Stockton has been the economic and employment hub of the County. The County's major land, water and air transportation facilities are located within this Planning Area. The Stockton Planning Area alone employed approximately 105,600 workers in 1990, representing over 58% of the County's total workers.

2. EMPLOYMENT PROJECTIONS

By the year 2010, Countywide annual peak employment is projected to increase by almost two-thirds from 182,100 in 1990 to 301,000 by 2010 (see Table I.D-2 and I.D-3). It is assumed that the annual rate of growth will be greater during the last ten years of the planning period, due to a second wave of job expansion which is expected to follow the housing growth anticipated during the 1990's.

During the next twenty years, retail and service sector growth is expected to increase at a greater rate than employment growth of the county as a whole (see Table I.D-3). Retail is expected to increase by almost 90% and service by 69% compared to 65.5% for all employment in the County.

TABLE I.D-3 SAN JOAQUIN COUNTY EMPLOYMENT PROJECTIONS BY SECTOR, 1990-2010

	<u>1990</u>	<u>Percent</u>	<u>2010</u>	<u>Percent</u>	<u>% Change 1990-2010</u>
Retail	27,700	15.2	52,600	17.5	89.9
Service	76,400	42.0	128,900	42.8	68.7
Other	78,000	42.8	119,500	39.7	53.2
Total	182,100	100.0	301,000	100.0	65.3

Source: 1990 U.S. Census; San Joaquin County Planning

Economic growth and diversity is expected to attract larger industries into the County, because of its strong trading links to Sacramento, Bay Area and San Joaquin Valley markets. Service and manufacturing centers are projected to expand along the I-5 and I-205 employment corridors. Employment and population growth is projected to concentrate along the I-5 and I-205 transportation corridor. As indicated in Table I.D-2, the Planning Areas of Stockton, Manteca, and Tracy are projected to accommodate 79% of the employment growth between 1990 and 2010. Tracy will climb from its number four ranking in 1990 employment, to second behind Stockton by 2010.

The concentration of industries into the employment corridors tend to attach a natural grouping of industries whose trading links are stronger to each other than to industries of other groups. This grouping of industries is defined as a cluster and typically, these clusters are classified into two varieties: 1) cluster-forming or primary industries; or 2) cluster-serving or secondary industries. Recent market studies of San Joaquin County indicate that the County has mostly cluster-serving industries with trading connections outside of the County. As an example, Stockton has experienced increases in the growth of industrial plants, but not in the primary industries.

San Joaquin County needs to define its regional economic role to continue to diversify its economy and employment base. It can concentrate on attracting more primary industries to establish cluster-forming industries to enhance the spin-off potential for manufacturing within the County. The other option is to strengthen its position as an ideal location for cluster-serving industries.

E. JOBS-HOUSING RATIO

The job-housing ratio is an indicator of the correlation between jobs and housing units; e.g., a 1.4 ratio means 1.4 jobs for every housing unit. Traditionally, San Joaquin County has had a self-contained economy with most individual cities maintaining a relative balance between jobs and housing. Rapid growth in the Bay Area has changed this situation as more people have relocated in the County because of its relatively lower housing costs and are commuting to jobs in the Bay Area, Sacramento, and the new employment centers along the I-580 and I-680 corridors. The jobs-housing imbalance created by residents commuting to jobs outside the County has increased traffic congestion within the County.

In 1990, the job-housing ratio in San Joaquin County was 1.10 (see Table I.E-1). The overall job-housing ratio for the County is projected to be 1.03 in 2010. The expectation is that the ratio will decrease early in the planning period and increase after the year 2000. Among communities in the I-5/I-205/SR99 growth corridor, Lathrop is projected to have the highest ratio of 1.81.

**TABLE I.E-1
SAN JOAQUIN COUNTY JOBS-HOUSING RATIO BY PLANNING AREA, 1990 AND 2010**

<u>Planning Area</u>	1990			2010		
	<u>Jobs</u>	<u>Dwelling Units*</u>	<u>Ratio</u>	<u>Jobs</u>	<u>Dwelling Units*</u>	<u>Ratio</u>
Stockton	105,600	93,700	1.13	153,100	138,900	1.10
Tracy	15,300	15,400	.99	51,900	62,600	0.83
Manteca	14,300	17,000	0.84	24,600	30,800	0.80
Lathrop	5,300	2,400	2.21	16,600	9,600	1.73
Lodi	25,400	24,800	1.02	31,900	33,400	0.96
Escalon	2,800	3,400	0.82	4,600	4,900	0.94
Ripon	4,600	3,500	1.31	6,100	5,500	1.11
Lockeford	1,700	3,200	0.53	3,400	4,000	0.85
Delta	2,800	600	4.67	3,300	600	5.50
Linden	2,200	1,400	1.57	2,600	2,300	1.13
Thornton	2,100	1,000	2.10	2,800	1,000	2.80
County Total	182,100	166,300	1.10	301,000	293,400	1.03

* Rounded to the nearest hundred.

Source: 1990 U. S. Census; San Joaquin County Planning

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A. LAND USE DEVELOPMENT

1. EXISTING DEVELOPMENT PATTERN

The most recent county-wide analysis of land use was performed by the County Department of Planning and Building Inspection in 1983. The data relied on land use information obtained in the Assessor's files. Information presented in this section is abstracted from that County report.¹

The land uses within the County, including the incorporated areas, are classified according to the Standard Industrial Classification code and presented by Planning Area. Parcels smaller than 10 acres and containing a house are considered to be in residential use. Parcels with an industrial or commercial use on them were coded for that use, regardless of the amount of vacant on the parcel.

As seen in Table II.A-1, the vast majority of the County (89%) was devoted to agricultural activities. Urban uses comprised less than 10% of the County's land area, with the balance in vacant territory. As expected, the Stockton, Lodi, Tracy, and Manteca Planning Areas had the largest amounts of urban acreage. The only apparent anomaly was the high percentage of residential uses in the Lockeford Planning Area. This may be explained by the fact that this Planning Area contains a number of large acreage (1-10 acres) rural homesites.

2. RECENT DEVELOPMENT ACTIVITY

The County has been growing rapidly. Much of this can be attributed to the in-migration of workers from the Tri-Valley area seeking more affordable housing than can be found in the Bay Area and from in-migration of Southeast Asians. Residential building permit activity between 1980 and 1990 is presented Table II.A-2.

Of the residential building permits issued from 1980 to 1990, most were in the cities. The cities accounted for virtually all new multifamily and duplex construction. The unincorporated territory accounted for almost all of the mobile home development. Residential development in Stockton, Lodi, and Manteca represented nearly 80% of all the new housing units in the cities. Within the unincorporated areas, the Lodi, Stockton, Tracy, and Manteca Planning Areas accommodated much of the new housing. Very little development over the three years occurred in the Ripon, Escalon, Delta, or Thornton Planning Areas.

Another perspective on recent development activity can be seen from changes in the secured tax rolls of the County's Assessor's Office.² Between 1987 and 1990, the total secured tax rolls increased from \$12.45 billion to \$16.59 billion, an average annual increase of 33.2%.

Much of this increase in dollars of secured tax rolls has occurred in the cities, where the combined value is approximately twice that of the unincorporated areas. Table II.A-3 shows the breakdown among cities and County.

TABLE II.A-1: EXISTING LAND USE BY PLANNING AREA (AS OF OCTOBER 28, 1983)

Planning Area	Residential ¹		Commercial		Industrial		Miscellaneous		Agricultural		Vacant		Total	
	Acres	% ²	Acres	% ²	Acres	% ²	Acres	% ²	Acres	% ²	Acres	% ²	Acres	% ²
Stockton														
Acres	14,952	36.47	4,435	43.80	1,298	23.78	5,940	22.91	43,842	5.76	4,226	40.89	74,693	8.75
% ³	20.02		5.94		1.74		7.95		58.70		5.66		100.00	
Lodi														
Acres	6,312	15.39	1,014	10.01	264	4.84	1,621	6.25	64,025	8.41	1,495	14.46	74,731	8.75
% ³	8.45		1.36		0.35		2.17		85.67		2.00		100.00	
Manteca														
Acres	5,669	13.83	1,150	11.36	1,074	19.67	3,066	11.83	51,422	6.76	1,145	11.08	63,526	7.44
% ³	8.92		1.81		1.69		4.83		80.95		1.80		100.00	
Tracy														
Acres	3,205	7.82	2,248	22.20	1,500	27.48	9,836	37.94	145,283	19.09	1,187	11.48	163,259	19.12
% ³	1.96		1.38		0.92		6.02		88.99		0.73		100.00	
Ripon														
Acres	1,614	3.94	78	0.77	334	6.12	392	1.51	20,218	2.66	101	0.98	22,737	2.66
% ³	7.10		0.34		1.47		1.72		88.92		0.44		100.00	
Escalon														
Acres	2,033	4.96	176	1.74	352	6.45	679	2.62	57,117	7.51	217	2.10	60,574	7.09
% ³	3.36		0.29		0.58		1.12		94.29		0.36		100.00	
Lockeford														
Acres	4,226	10.31	150	1.48	479	8.77	559	2.16	110,029	14.46	1,182	11.44	116,625	13.66
% ³	3.62		0.13		0.41		0.48		94.34		1.01		100.00	
Linden														
Acres	1,382	3.37	62	0.61	8	0.15	319	1.23	86,276	11.34	339	3.28	88,386	10.35
% ³	1.56		0.07		0.01		0.36		97.61		0.21		100.00	
Thornton														
Acres	883	2.15	325	3.21	32	0.59	523	2.02	67,795	8.91	144	1.39	69,702	8.16
% ³	1.27		0.47		0.05		0.75		97.26		0.21		100.00	
Delta														
Acres	669	1.63	476	4.70	111	2.03	2,967	11.44	114,234	8.91	144	1.39	69,702	8.16
% ³	0.56		0.40		0.09		2.50		96.20		0.24		100.00	
Total County	41,001	100.00	10,126	100.00	5,459	100.00	25,927	100.00	761,028	100.00	10,336	100.00	853,877	100.00
	4.80		1.19		0.64		3.04		89.13		1.21		100.0	

¹ Rural parcels which are five acres or less and which contain a house are considered residential.

² Percentage of acreage in this designation within the County.

³ Percentage of acreage within the planning area.

TABLE II.A-2: RESIDENTIAL BUILDING PERMIT ACTIVITY, 1980-1990

<u>Area</u>	<u>Single Family</u>	<u>Duplex</u>	<u>Multi- Family</u>	<u>Mobile Home</u>	<u>Total Demo</u>	<u>Units</u>
Stockton	9,605	318	4,125	275	829	13,494
Delta	9	0	0	21	1	29
Thornton	35	0	3	122	7	153
Lodi	3,781	317	2,191	89	234	6,144
Lockeford	539	0	8	132	20	659
Linden	279	0	0	46	12	313
Escalon	588	14	53	89	33	711
Ripon	1,133	42	205	47	22	1,405
Lathrop	55	2	0	5	2	60
Manteca	4,758	84	1,278	1128	83	6,165
Tracy	5,333	242	423	91	33	6,056
Total	26,115	1,019	8,286	1,045	1,276	35,189

Source: San Joaquin County Building Permits 1980-1990; COG

TABLE II.A-3: VALUE OF COUNTY DEVELOPMENT, 1987 AND 1990
(IN MILLIONS OF DOLLARS)

	<u>1987</u>	<u>1990</u>	<u>% Change</u>
Stockton	\$ 4,175	\$ 6,190	31.1
Lathrop	-	-	-
Lodi	1,170	1,949	35.1
Manteca	665	1,196	41.9
Tracy	626	1,411	68.2
Escalon	82	152	47.6
Ripon	151	310	58.2
Cities Subtotal	\$ 6,869	\$11,541	41.7
Unincorporated Area	\$ 3,950	\$ 5,051	17.2
County Total	\$10,819	\$16,592	33.2

Source: San Joaquin County Assessor's Office.

3. ADEQUATE LAND SUPPLY TO MEET PROJECTED GROWTH

The population and employment projections presented in Section I of the Technical Appendices (Population, Housing, and Employment) can be translated into a demand for land. Estimates of land demand depend largely on certain key assumptions, those being:

- o The future type of residential development in which residents desire to live; i.e., rural, very low, low, medium, medium-high, or high density areas.
- o The actual density at which residential development occurs; for example, low density development can occur anywhere from 1 dwelling units per gross acre to 6 dwelling units per gross acre.
- o The location of the residential development since the permitted densities vary among the County and the various cities.
- o The type of employment in which future employees are occupied.
- o The average amount of land required for each type of job.

Residential Development. The distribution of residential densities needed to accommodate projected growth is expected to be similar to the 1987 distribution, with the vast majority of the County development occurring at low density residential (2-6 dwelling units per gross acre). However, two slight differences are projected. First, the share of rural residences is expected to decline slightly with efforts to limit this type of development. Second, development in several of the residential designations (rural, low, medium, and medium-high) is anticipated to occur at higher average densities than in 1987 because of greater land costs. Thus, development in the low density range was assumed to be 4 dwelling units per gross acre in 1987; in 2010, it is assumed that the average density will be around 4.5 dwelling units per gross acre. The average densities for each of the residential designations in 2010 is presented in Table II.A-4. The average size is expected to decrease to about 2.74 persons per household in 2010.

Nonresidential Development. One goal of the General Plan is to provide adequate amounts of commercial acreage to serve the commercial needs of the projected population growth. Similarly, sufficient industrial land should be set aside to accommodate future growth in the industrial sectors. Yet, the General Plan should not designate too much property for either type of development. Planning an excess amount of land for nonresidential development can lead to several problems. Overbuilding commercial or industrial areas can lead to long vacancies which can lead to maintenance problems. Another possible effect of providing an oversupply of nonresidential lands is the development of unplanned areas of mixed land uses. For example, in San Joaquin County, there are approximately 600 acres which are designated as commercial and about 950 acres which are designated as industrial on the General Plan that are developed with residential uses. If too much land is planned for commercial

or industrial development, there will be no incentive for the residential property to redevelop to the proper land use. Most likely, the area would develop into a mixed use area with commercial or industrial uses scattered throughout the area instead of being consolidated into one area.

The amount of commercial land which is needed is based on the population to be served. The County's General Plan includes several types of commercial designations, each intended to serve a different need of the community and a different market area. The amount of industrial land which is needed is based on the availability of land, services, and transportation, and the presence of raw materials which can be processed.

**TABLE II.A-4: RESIDENTIAL CATEGORIES AND DENSITIES
by PLANNING AREAS: 2010**

Planning Area	Dwelling Units/Gross Acre					
	Rural Residential	Very Low Density Residential	Low Density Residential	Medium Density Residential	Med-High Density Residential	High Density Residential
Stockton	--	1.5	5.0	7.0	12.0	29.0
Delta	--	--	--	--	--	--
Thornton	--	--	4.5	9.0	14.0	--
Lodi	--	--	5.0	7.0	12.0	24.0
Lockeford	--	1.5	4.0	8.0	12.0	18.0
Linden	--	1.5	4.5	8.0	12.0	18.0
Escalon	--	--	4.25	7.5	12.0	16.0
Ripon	--	--	5.0	10.0	12.0	16.0
Lathrop	--	1.5	4.5	8.0	12.0	18.0
Manteca	--	2.0	5.0	9.0	13.0	17.0
Tracy	.5	1.5	4.5	7.5	14.5	19.0

Source: San Joaquin County Planning

Standard employment densities have been developed for the County as a whole by the County Planning Division with the help of information provided by the cities; these densities can be found in Table II.A-5.

4. DEVELOPMENT CONSIDERATIONS FOR INDIVIDUAL LAND USES

This section of the appendix only addresses residential, commercial, and industrial land uses in the County. Other uses, such as public facilities, open space, and agriculture are discussed in separate appendices.

Land Use Development (cont.)

TABLE II.A-5
Employment Densities for Commercial and Industrial Categories by Community
Year 2010 (In Employees/Acre)

	San Joaquin County	Stockton	Lodi	Escalon	Filpon	Manteca	Lathrop	Tracy	New Community
Commercial									
Neighborhood Commercial (CC/N)	24.2	29.0	29.0	24.2	58.1	29.0	33.9	24.2	24.2
Community Commercial (C/C)	24.2	29.0	29.0	24.2	58.1	29.0	33.9	24.2	24.2
General Commercial (C/G)	24.2	29.0	29.0	24.2	58.1	29.0	58.1	24.2	24.2
Freeway Service (C/FS)	24.2	29.0	--	24.2	--	29.0	33.9	24.2	24.2
Office Commercial (C/O)	27.2	54.5	38.1	38.1	65.3	38.1	70.8	65.3	43.6
Rural Service (C/RS)	24.2	--	--	--	--	--	--	--	24.2
Commercial Recreational (C/R)	9.7	--	--	--	--	--	--	--	9.7
Industrial									
Warehouse (I-W)	10.1	--	13.4	--	16.8	--	--	16.8	13.0
Industrial Park (I-P)	26.0	52.3	--	--	--	--	--	43.6	26.0
Limited Industrial (I/L)	15.4	30.7	20.5	15.4	25.6	20.5	25.6	23.1	26.0
General Industrial (I/G)	8.1	19.4	12.9	8.1	16.1	9.7	19.4	8.1	13.6
Public or Institutional	52.3	52.3	52.3	52.3	52.3	52.3	52.3	52.3	52.3
Source: San Joaquin County Planning.									

Residential Development. Residential development is the major user of land in urban areas, as well as a significant factor in the location of other types of development. Therefore, residential growth patterns will play a major role in determining the form of urban growth. While existing urban areas will be able to accommodate some increase in population by infill of vacant land, expansion of urban areas onto agricultural lands is anticipated if the projected growth is to be accommodated. Residential development is also one of the more sensitive types of urban development. Residences need to be protected from noise, traffic congestion, hazards such as flooding, and other objectionable influences. At the same time, extensive residential sprawl could encroach into viable commercial agricultural lands, disrupt sensitive natural resources, and require costly extension of utilities and roads.

To avoid these adverse effects and to ensure development occurs in a rational fashion, the General Plan needs to provide guidelines about where development should occur, what types of standards should be imposed to maintain residential areas, what types of standards should be enforced to ensure compatibility with adjacent land uses, and what types of residential areas should be accommodated within the County.

Location. The major opportunities for urban expansion occur in four locations in the County: the cities; the unincorporated areas around the cities where services are available; unincorporated urban communities such as Woodbridge, Morada, French Camp, Lockeford, Linden and Thornton; and new urban communities. There are two critical elements in determining whether urban development should occur. First, the land being considered for urbanization should be suitable for urban development. The area should be free of environmental constraints; it should not be in an area that would significantly curtail commercially viable agricultural operations; it should be in an area where sewer, water, and drainage can be readily provided. In short, the ideal locations would be infill of vacant lands within urbanized areas or extension of existing urban areas.

Rural residential development, by contrast, can be accommodated within rural communities and in agricultural areas, provided that it does not impose a demand for urban services or disrupt viable commercial agriculture. These areas generally contain scattered residential development on small acreages interspersed with and surrounded by agricultural land. Rural residential development may be permitted in those areas where land division practices have resulted in the creation of numerous small parcels such that agriculture is no longer economically viable on a commercial basis. It would not be desirable in potential growth areas of cities, since development at rural residential densities are difficult to develop into urban-size lots when urban services become available. Neither should this type of development be permitted in areas with large agricultural parcels. Each rural residential homesite may require more than six times the land than does an urban homesite. Therefore, this density of residential development heavily impacts agricultural land.

Residential Organization. Within urban areas, it is desirable to encourage residential areas to develop according to the concept of community and neighborhoods. Essentially, communities provide a social, political, and economic organization to which local residents and businesses can relate. Communities typically are made up of smaller neighborhoods. This concept enables large communities to be dealt with

on more recognizable and human terms and to consider the needs of residents on a more individual basis. Major features of the neighborhood-community concept include:

- o A neighborhood is planned and developed as a cohesive unit (usually containing 3,000 to 5,000 people in large urban communities) with densities established to encourage a variety of housing types;
- o Neighborhoods should be of sufficient size to support an elementary school and be served by adequate park and recreational facilities;
- o There should be a commercial area that will adequately meet the needs of the residents for convenient goods and services. The commercial area should be designed in a manner least disruptive to adjacent residents and be easily accessible by pedestrians and bicyclists;
- o Neighborhoods should not be divided by major roadways. Instead, major roadways should serve as borders for neighborhoods;
- o There should be a community shopping area to supply a wider variety of goods and services than provided by the neighborhood commercial areas.
- o An urban community is a cohesive development area which, if large, may encompass from three to five neighborhoods. Each community should be served by a high school or junior high school. Many of the County's unincorporated developed areas are not this large; in fact, the majority have populations that are more typical of large neighborhoods in highly urbanized settings. Yet, they function as urban communities, often offering its residents a diverse range of services such as community wastewater facilities, public water, and terminal drainage.

By contrast, there are other developed areas that have evolved primarily to serve a surrounding agricultural area, are not anticipated to grow, and do not require public services. Because there is typically a social or economic linkage among its residents and the surrounding areas, these areas should be recognized as rural communities.

Types of Residential Development. In residential areas, density is used to establish a minimum and maximum number of dwelling units in an area. The application of density regulations provides a basis for estimating needed public services and facilities and for many other types of land use decisions. In the General Plan, density is expressed as a range of dwelling units per gross acre (a gross acre includes land taken up by local streets). Associated with each density range are also population estimates. The population figures typically vary from one to three persons per dwelling unit. The average population per dwelling unit for the unincorporated portion of the County was 2.77 person in 1990.

This General Plan is trying to encourage an overall increase in urban residential densities. This objective is considered desirable because it allows development to make more efficient use of utilities and public facilities and services and requires less land area to accommodate a given future population. In order to accommodate the County's future population and to provide a choice among different housing types, six residential density ranges are established.

Rural Residential. Single family housing on large lot (1-5 acres) development, within rural communities or existing in urban communities, where full urban services are not available nor expected.

Very Low Density Residential. Single family housing on relatively large lot development (1-2 primary dwelling units per gross acre) within urban communities.

Low Density Residential. Single family housing at 2-6 dwelling units per gross acre (approximately 17,000-6,000 net square feet per dwelling unit) within urban communities.

Medium Density Residential. Predominantly single family housing in mobile homes, or in attached units, such as duplexes and triplexes (6-10 dwelling units per gross acre), within urban communities.

Medium-High Density Residential. Multifamily housing in townhouses, garden apartments, and other similar structures (10-15 dwelling units per gross acre). Typically, located in the cities and only occasionally within an unincorporated urban community.

High Density Residential. Multifamily housing in apartment buildings (15-40 dwelling units per gross acre). Typically, located only around the downtown and major commercial areas of cities.

Service, Access, and Circulation Requirements. For residential development to occur at the densities planned in urban areas, basic services such as public water, sewage disposal, and drainage are necessary. The requirement for these services at the time of development will eliminate the problems often caused by development occurring on private systems or with incomplete services. Concentrating growth in areas where adequate services are available or where existing systems can be easily expanded can lower construction costs and lower service delivery expenses.⁶ Since it is more economical to develop those areas closest to where the services exist, compact development is encouraged and "leapfrog" development is discouraged.

In contrast, rural residential development does not require the full range of public services. If the lots are large enough, water may be provided by individual wells, sewage disposal by individual septic tank-leach field systems, and drainage accomplished by ponds on the individual parcels. Care must be taken to ensure such development occurs in an environmentally sound manner. Problems have arisen in some areas of the County where high concentrations of wells have depleted groundwater water supplies and

where high concentrations of septic systems have degraded the water quality of the groundwater. The smaller rural residential parcels need community water and drainage systems.

All residential parcels should have frontage on a public road, except where standard roads cannot feasibly be provided. This is desirable so that proper access is provided to residential development. Flag lots should be allowed only where existing improvements, physical conditions, or other unique circumstances dictate that they be developed as flag lots.

Strategies for Achieving Desirable Residential Development. There are various techniques available to the County to obtain the quality and type of housing it desires. Some of these techniques and strategies are presented below.

Neighborhood Preservation. Current development practices often do not lend themselves to the creation of cohesive neighborhoods. Therefore, where identifiable residential neighborhoods exist, they should be maintained. Methods which can be used to maintain neighborhoods include:

- o Preventing the intrusion of incompatible land uses into residential neighborhoods;
- o Preventing significant increases in traffic volumes on local streets;
- o Maintaining and upgrading the existing housing stock;
- o Avoiding the displacement of residents;
- o Channeling the use of rehabilitation and Community Block Grant funds to improve the housing stock and provide basic neighborhood facilities and services;
- o Supporting private neighborhood improvement programs; and
- o Promoting the use of more specific planning tools such as Area Development Plans or Specific Plans.

It should be recognized that some nonresidential uses are necessary and desirable in residential areas. They are typically support services for nearby residents. Examples of such uses include schools, parks, neighborhood commercial uses, churches, and in some instances, offices. While these support services are necessary, their locations need to be reviewed carefully to ensure that they do not adversely affect the residential character of the neighborhood or community. Particular concerns exist with traffic and noise.

Density Bonuses. A technique to encourage development of higher density housing is the use of density bonuses which permit an increase in residential units over the maximum number of allowed

units within a specific zone. A 25 percent density bonus plus an additional incentive may be given to developers to encourage them to provide residential units for low and very low income households. The additional incentive includes a variety of modifications to zoning code requirements, such as reduction in setback requirements, or reduction in fees.

Planned Development. Within any residential area, a wider variety of dwelling types could be achieved through the use of a planned development. The intent of the planned development is to encourage design flexibility and diversity in housing types, styles, and prices. Projects submitted under this incentive program may also receive density bonuses.

Commercial Activities. Commercial activity in San Joaquin County is concentrated in the urban communities. The cities provide most of the community and regional commercial areas and most of the offices. Most of the commercial acreage is located within the Stockton Planning Area. Other commercial uses are found in clusters along the major highways, with uses primarily to serve the needs of the highway traveler, or in the rural areas to serve the needs of the agricultural community. In planning commercial areas, uses should be tailored and located to best serve their market area.

Compatibility with Market Area. Different types of commercial areas provide different goods and serve different market areas. For example, a neighborhood commercial area is providing those services required on a daily basis and is serving the neighborhood market area. A community commercial area provides goods which are needed less frequently and is serving a communitywide market area. The development of commercial areas should be consistent with their respective market areas in terms of location, size, accessibility, and type of activities. Market analyses to determine the size and strength of the market and the ability of existing businesses to satisfy that market are critical to assuring that adequate commercial facilities are provided to meet the needs of San Joaquin County.

Organization of Commercial Areas. Many commercial areas develop in strips along the major roadways. This is inconvenient for the shopper if more than one purchase is required and makes comparison shopping difficult. This type of development also disrupts circulation, causes conflicts with other land uses, and is often unsightly. It interferes with the flow of traffic because each use has its own access point. Land use conflicts can develop because strip development often occurs without considering the adjacent land uses. Unsightly and noisy activities, such as garbage collection and deliveries, are usually done at the rear of the building, often adjacent to residential development. Strip developments also commonly develop without adequate parking or unloading facilities.

The grouping of commercial uses allows the site to be developed as one functional unit with adequate and properly designed parking, truck access separate from the customer parking areas, and buffers for adjacent land uses. Circulation is improved by the reduction of access points to the roadway. The grouping of uses also allows more convenient comparison shopping.

Types of Commercial Development. To satisfy the various commercial markets within San Joaquin County, seven commercial land use designations are established.

Neighborhood Commercial. Small, localized retail and/or service businesses that offer goods and services to the immediate neighborhood. Typical uses include grocery stores, barber and beauty shops, pharmacies, hardware stores, and bakeries.

Community Commercial. Areas offering a full range of commercial retail and service establishments, allowing comparison shopping and serving urban communities or regional markets. Typical uses include clothing and appliance stores, banks, restaurants, theaters, and administrative and professional offices.

Office Commercial. Areas for administrative and professional offices. Typical uses include clusters of offices and high density residential uses.

General Commercial. Areas offering a wide variety of individual, specialized retail and service uses that are typically automobile-oriented, freestanding, and catering to urban communities and regional markets. Typical uses include large discount stores, automobile and other motor vehicle sales and service, and building supply firms.

Freeway Service. Areas for commercial uses oriented almost exclusively to serving the needs of the freeway traveler. Typical uses include gas stations, truck stops, restaurants, and motels.

Rural Service Commercial. Areas for retail and service uses which are frequently required by rural residents and the surrounding agricultural community. Located within rural communities and at a limited number of crossroads within rural areas, rural commercial uses typically include grocery stores, pharmacies, hardware stores, banks, restaurants, and repair services.

Commercial Recreation. Areas for recreation-oriented, intense commercial activities and associated facilities. Typical uses include large scale, intense uses, such as amusement parks.

Access and Parking. Directly related to the amount of floor space occupied by commercial uses is the requirement for vehicular parking to serve it. In some instances, the future stability of a commercial area could be influenced by the adequacy of the parking available to the customers ⁷.

Parking lots should be designed with provisions for pedestrians. Delivery traffic should be separated from the other traffic in the parking lot. Landscaping, including trees, should be provided in parking lots. Parking lot landscaping not only improves the visual environment, but it can help moderate heat and wind and help minimize nuisances, such as glare and light ⁸. Standards for tree coverage and landscaping should vary by the size of the parking area.

Adequate access is also important for the viability of commercial areas. Traffic should be able to move easily to and from commercial areas; otherwise people will tend to avoid the area. If access to shopping areas are by roadways which are inadequate to serve the volume of traffic, congestion will occur. Consequently, no commercial development should have its main access provided by local streets. Access should be provided by roadways which are at least Collectors. Large commercial areas should have access provided by even larger roadways. Freeway Service areas should have access from full freeway interchanges.

Compatibility with Adjacent Land Uses. Improperly located or poorly designed commercial areas can create land use conflicts with adjacent uses, especially residences. Conflicts can include increases in traffic on local roads, noise, odor, light and glare, and visual impacts.

Such problems can often be avoided if commercial uses are properly located and designed. By keeping traffic on major roads and access and parking areas away from residences, much of the traffic and noise problems would be minimized. Similarly, the use of landscaping and buffers, such as walls, can screen the visual impacts on nearby residences and can contribute to a more attractive appearance. This is especially true for those commercial areas serving only a neighborhood or smaller number of people. These should be permitted to develop at only one corner of an intersection.

Another technique to achieving greater land use compatibility is to examine the operational characteristics of the commercial use relative to the adjacent uses. Intensive commercial activities, with their high traffic volumes and truck traffic, should not be situated near residential areas. Opportunities may exist to site offices as a transition or buffer between the intensive commercial areas and residences.

Limiting the extent of commercial encroachment into residential areas is important to minimize land use conflicts and to minimize market pressures to convert viable residential areas to commercial uses. Consequently, commercial designations placed along roadways to recognize strip commercial development should be interpreted as extending only to the depth of the lots fronting on the roadway or the depth of the existing commercial use if the use extends further back.

Industrial Development. In the past, industrial development in San Joaquin County was primarily related to agricultural activities. In recent years, there has been some diversification to a much wider variety of industrial businesses. As of October 1983, there were about 5,500 acres of industrial development in the County, with most in the Stockton, Manteca, and Tracy Planning Areas (1,298 acres, 1,074 acres, and 1,500 acres, respectively).⁹ Between 1984 and 1987, inclusive, an additional 600 acres have been constructed.¹⁰ Because industry is an essential part of a balanced economy and community and provides the County with payroll dollars and a property tax base, promotion of proper industrial development needs to be expanded. Promotion must be based on an understanding of industry's needs.

The needs of industrial uses vary widely. However, there are several requirements which are common to many industries. These include the need for adequate transportation facilities, proper physical

characteristics of the property, adequate services and facilities, availability of labor, and consistent regulations.

Access to Transportation Facilities. All major forms of transportation are available in San Joaquin County. Interstate 5 and State Route 99 run north and south through the County while numerous State Routes run east and west. Several major rail carriers serve the County, the Stockton Metropolitan Airport offers both passenger and freight service, and the deep water channel in the San Joaquin River provides ship access to the Port of Stockton. This variety of transportation facilities allows easy access to raw materials from a large area and to a variety of markets for the sale of goods. Where possible, industrial areas should be located in close proximity to the major transportation routes. This will provide maximum convenience to and from the industrial areas and reduce the possibility of conflicts occurring between industrial traffic and residential uses.

The major circulation problem for industrial developments in San Joaquin County may be the presence of some freeway interchanges which are not designed to handle truck traffic and inadequate local street systems in some areas. Each industrial area should have its main access provided by roadways which are at least Minor Arterials. This will help assure that access between the industrial areas and highways is adequate to carry industrial traffic. Keeping industrial traffic off local streets and Collectors will also help reduce conflicts with residential areas. Within industrial areas, roads should have sufficient rights-of-way for trucks to maneuver.

Physical Characteristics. The size and shape of a parcel and the presence of physical hazards are all considerations for industrial development. Industrial developments normally acquire land for their present operations as well as land for possible future expansions. If a parcel is too small or poorly shaped then additional property must be purchased and assembled, which is a time consuming and expensive process.¹¹

The presence of hazards creates additional problems and added expense to development. New industrial areas should not be planned in areas subject to hazards. For example, the type of soil on the property is an important determinant of possible problems. Expansive soils swell when they absorb water and shrink as they dry. Construction on this type of soil requires special foundation and drainage designs to avoid structural damage. Similarly, potential flooding hazards should be recognized. In areas subject to the 100-year flood, buildings must either be raised so that the lowest floor elevation is one foot above the flood elevation or an alternative method of flood proofing must be used.

Services and Facilities. For most industries, it is easier to develop if all services and facilities are or can be made available at their site. These services may include sewer, water, drainage, gas and electricity, and fire protection. For some industries, the availability and cost of water and power are major considerations. Industry may not be an asset to an area unless the necessary services are available.

There may be some instances where a wastewater treatment plant would not be required. Canneries, for example, can use their wastewater for irrigation. Septic tanks may be adequate for some industries, such as certain warehouse uses which have only employee waste. Uses which are allowed to develop on septic tanks would have to be very limited to assure that nothing is put into the septic tanks which may create a health hazard. Septic tanks are not acceptable for many industries because they are unable to handle some of the chemicals used. There is a potential for contamination of the soil and groundwater if inadequate decomposition of waste occurs.

Another major concern is the provision of a water supply adequate for firefighting. Industries can create serious firefighting problems, so that it is critical that an adequate water supply is available.

Availability of Labor. Some types of industries require large volumes of unskilled labor, whereas others require smaller volumes of skilled labor. San Joaquin County has a high unemployment rate, indicating that there would be labor available for some types of industrial development.

Environmental Considerations. Improperly planned, designed, or operated industrial uses can create serious environmental problems. Some of the more common impacts include air and water pollution and problems created by the generation and disposal of wastes, which often includes hazardous wastes.

Numerous federal, state and local laws regulate emissions, especially those into air and water, thereby limiting the pollution potential. Much work is presently being done in the field of hazardous wastes, both on trying to determine the extent of the problem and in establishing regulations to control it.

Some industries have more of a potential for creating environmental problems than others. These types of industries need to be located away from other types of urban land uses to prevent possible safety and health problems.

Regulations and New Technology. Regulations may not take into account changes in technology. This is especially true for changes in production methods. For example, a zoning ordinance which only lists uses permitted within various zones does not distinguish between two plants manufacturing the same product in which one pollutes and one uses a newer, cleaner process. Along with this, regulations may not take into account changes in environmental and safety laws. Regulations also may not provide for new industrial uses. With changing technology, new types of businesses are continually being started.

Another change which needs to be recognized is the way which industries are developed. Most regulations are oriented toward separate developments on individual lots, with little or no mention of developments occurring as industrial parks.

Types of Industrial Activities. Industrial activities have been classified in a number of different ways—sometimes based on their end product, sometimes based on their potential impact on adjacent land uses. The latter approach is used to establish three industrial land use designations for San Joaquin County.

Limited Industrial. Areas encompassing a wide range of industrial activities whose impacts are typically not detrimental to surrounding uses. Typical uses include warehouses, research and development, distribution facilities, and light manufacturing.

General Industrial. Areas encompassing a wide range of industrial activities whose location and operational characteristics typically involve moderate to high nuisances for surrounding uses if not mitigated. Typical uses include lumber yards, heavy processing and manufacturing operations, and extensive food processing operations.

Truck Terminal. Areas and buildings used by motor freight vehicles or trucks of common carriers for purposes of transferring, storing, assembling, and sorting cargo or for purposes of storing and maintaining the trucks used for such purposes on a regular basis.

Compatibility with Adjacent Land Uses. The potential to create traffic, noise, dust, odor, and visual impacts requires that industrial developments be carefully located and designed. Techniques that can be used to minimize the effects on adjacent land uses include the use of buffers, development conditions, industrial parks, and performance standards.

Buffers. Buffers can be used to provide relief from the noise, dust, and visual impacts created by industrial development. Buffers can include solid fences, vegetation, or open space which provide room between the industrial developments and the surrounding land uses.

Development Conditions. Projects which require a discretionary permit can have conditions imposed which affect the way the proposal is developed or the way it is operated.

Industrial Parks. Industrial parks are designed to provide a coordinated environment for a variety of industrial uses. Prior to the development of an industrial park, a site design is reviewed which considers service locations, circulation, parking, landscaping, outdoor storage areas, the use of buffers if necessary, and other similar features. The review of the total park site eliminates the need for such an intensive review of individual projects.

Performance Standards. Performance standards establish measurable limits which cannot be exceeded by any proposed use. Standards are normally defined for density or floor area ratio; amounts of impervious surfaces; noise, dust, glare, and heat levels; air pollutant emissions; and other similar potential nuisances. Application of these standards ensures that adjacent uses will not be adversely affected. They also serve to protect industries from arbitrary exclusion from an area based solely on the operational characteristics of a particular type of industry.

Endnotes

1. San Joaquin County Community Development Department. General Plan - Land Use Study. October 1983.
2. Jim Formento, Assistant Assessor, San Joaquin County Assessor's Office. Personal communication. January 30, 1989.
3. San Joaquin County Economic Development Association. Industrial Construction by Year.
4. San Joaquin County Planning Department. General Plan - Land Use Study. October 1983.
5. San Joaquin County Economic Development Association. Industrial Construction by Year.
6. Stokes, Samuel N. "Rural Conservation" in Environmental Comment. May 1980.
7. Gallion-Eisner. The Urban Pattern. 1975.
8. Corwin, Margaret A. "Parking Lot Landscaping" in Planning Advisory Service, Report Number 335. 1978.
9. San Joaquin County Planning Department. General Plan - Land Use Study. October 1983.
10. San Joaquin Economic Development Association. Industrial Construction by Year.
11. City of Stockton Community Development Department. Memorandum to the Planning Commission on Vacant Land Designated Industrial on the General Plan. February 22, 1985.

B. HOUSING

1. INTRODUCTION

Chapters I and II of Volume III contain the background analysis and needs assessment that contributed to the housing policies and programs described in the General Plan. These chapters along with the Housing portion and other portions of Volume I of the Plan comprises San Joaquin County's new Housing Element, which was required by State law to be adopted by July 1, 1992. As such, these various components collectively constitute the 1992 Housing Element.

Purpose. The purpose of this and other sections of the General Plan which address housing issues is the formulation of an official policy position that will lead toward the provision of safe, healthy, and affordable housing for all County residents, both existing and future. This official policy position is intended to provide a framework for long-term planning and to serve as a basis for daily decision making in matters related to housing. Although it is recognized that the complete attainment of all housing goals is a difficult, if not impossible task, it is felt that through the use of the policies, implementation measures, and specific action programs specified in this General Plan, the greatest impact on the housing needs in San Joaquin County can be made given the existing resources.

Consistency with Other Sections. In updating the County's General Plan, careful consideration was given to assure that the sections dealing with housing, particularly the section dealing with housing goals, policies, and implementation measures, constitute an overall statement which is integrated and internally consistent with other sections of the General Plan. Numerous reviews were conducted by Planning Division staff of existing and new housing goals, objectives, and implementation measures to evaluate compatibilities with other non-housing related goals, objectives, and implementation measures. Workshops were conducted with the Planning Commission to obtain direction and to refine products. Existing and proposed housing implementation measures were evaluated and modified to mitigate or eliminate conflicts and to achieve a balance with the other competing non-housing policy objectives of this General Plan revision.

Citizen Participation. In the preparation of the General Plan and the County's 1992 Housing Element, the County sought to achieve a public participation which involved all segments of the Community. The process formulated to solicit citizen input in the review of this element and other sections of the General Plan is summarized in modified outline form below:

I. Opportunities for Public Review

A. Prior to Release of Public Review Drafts.

1. **Written Comments:** The public was notified that any person or organization could submit written comments regarding the General Plan to the Planning Division. It

was noted that these comments were considered by the County's Planning Consultant or by the County Planning staff in preparing the public review drafts. It was also noted that written comments could be submitted on any material reviewed by the Planning Commission.

2. Oral Comments: The public was informed that the public could attend workshops held for the Planning Commission to review preliminary drafts. It was noted that the public could speak on these preliminary drafts when the Planning Commission asked for comments and that the public's comments would be presented to the County's consultant who would consider them in preparing the public review drafts.
3. Mailing List: The public was informed early in the revision process that interested individuals and organizations could be put on a mailing list to be notified of future public meetings on the drafts.

B. After Release of Public Review Drafts. Opportunities for public input was provided at the following public hearings and meetings:

1. Draft Review meetings
2. Planning Commission workshops and public hearings
3. Board of Supervisors workshops and public hearings

Housing Chapter Organization. The Housing Chapter is organized into five major sections:

Population and Housing Characteristics. This section examines various U.S. Census and other data in order to gain an understanding of the housing situation in the County. Data is presented for the unincorporated portion of each of the eleven planning areas of the County. Lathrop, which was incorporated in 1990, is included as a part of the Manteca/Lathrop Planning Area for data prior to 1990. Data totals for the unincorporated area, for the cities collectively, and for all of San Joaquin County are also presented.

Housing Needs. This section analyzes housing needs on two levels: immediate housing needs analyzed with respect to affordability, overcrowding, substandard housing, and the housing needs of special groups; and future housing needs projected for the 1992-1997 period.

Housing Constraints. This section discusses the effects of governmental and nongovernmental constraints on the supply, availability, and affordability of housing in the County.

Energy Conservation. An analysis of the County's involvement in furthering opportunities for energy conservation in residential developments is provided in this section.

Housing Element Review. This section assesses the progress made by the County in attaining its Housing Goals and objectives and in implementing the Housing Program specified in the 1987 Housing Element. The status of activities listed in the 1987 Housing Element is provided.

2. POPULATION AND HOUSING CHARACTERISTICS

In order to gain some understanding of the housing situation within the County, an overview of selected population and household characteristics is necessary. Unfortunately most data is still only available for 1980; in those areas in which any 1990 data is available, it has been used where possible. The data presented is primarily for the unincorporated portion of San Joaquin County. Data concerning an individual planning area refers to the unincorporated portion of that planning area. County totals (i.e., the sum of the incorporated and unincorporated areas) and city totals are provided in most cases for purposes of comparison.

Household Population. From 1980 to 1990, household population (i.e., population residing in housing units) in the unincorporated portion of the County increased by 6,813 people after declining by 3,900 people between 1970 and 1980 (see Table II.B-1). The cities, by contrast, increased by 120,788 people. The cities rate of increase collectively was, therefore, 3.6 percent per year compared to the County rate of .6 percent per year.

These trends are not uniformly shared by all planning areas. During the 1980-1990 period, for example, the unincorporated portion of the Stockton Planning Area experienced a net increase of only 2,010 people, less than both the Lodi and Manteca Planning Areas which have much smaller populations. Other planning areas increased by varying amounts: from 16 people in the Delta Planning Area to 1,976 people in the Tracy Planning Area; the Ripon Planning Area decreased by 116 people. Also, while Stockton increased by only 3.7 percent during this time period, six of the other planning areas increased by much greater percentages: Lockeford by 21.0 percent, Lodi by 22.8 percent, Thornton by 26.1 percent, Linden by 26.4 percent, Tracy by 28.0 percent, and Manteca by 30.8 percent.

Persons in Group Quarters. Table II.B-2 provides information on the housing of persons in various group quarter categories in 1980. In terms of planning for the housing needs of all segments of the population, three group quarter categories hold special interest: "Inmates of Homes for the Aged," "Inmates of Mental Hospitals," and "Population in Other Group Quarters." Concerning "Inmates of Homes for the Aged," Table II.B-2 shows that most (93.7 percent) group quarter housing for the aged (i.e., nursing homes, convalescent homes and resthomes) is located within the incorporated area of the County. This is not unexpected since such facilities require proximity to urban services (e.g., doctors, public transportation)

**TABLE II.B-1:
HOUSEHOLD POPULATION 1960, 1970, 1980, 1990**

PLANNING AREA *	1960		1970		1980		1990	
	Number	Pct	Number	Pct	Number	Pct	Number	Pct
Stockton	67,262	28.6	63,763	22.8	54,660	16.2	56,671	12.2
Delta	1,796	0.8	1,686	0.6	1,440	0.4	1,456	0.3
Thornton	1,984	0.8	1,876	0.7	1,961	0.6	2,474	0.5
Lodi	9,597	4.1	11,038	3.9	11,460	3.4	14,070	3.0
Lockeford	3,951	1.7	5,072	1.8	7,434	2.2	8,996	1.9
Linden	2,672	1.1	3,014	1.1	3,396	1.0	4,292	0.9
Escalon	4,148	1.8	4,597	1.6	4,926	1.5	5,338	1.1
Ripon	2,680	1.1	2,676	1.0	2,664	0.8	2,548	0.5
Manteca	8,964	3.8	11,844	4.2	13,198	3.9	9,137	2.0
Lathrop	N/A	N/A	N/A	N/A	N/A	N/A	994	0.2
Tracy	6,704	2.9	6,528	2.3	7,056	2.1	9,032	1.9
Total Unincorporated	109,758	46.7	112,094	40.0	108,195	32.1	115,008	24.7
Total Cities	125,200	53.3	168,269	60.0	229,256	67.9	350,044	75.3
Total County	234,958	100.0	280,363	100.0	337,451	100.0	465,052	100.0

* Unincorporated portion only

Source: 1960, 1970, 1980 1990 U.S. Censuses; San Joaquin County Planning.

**TABLE II.B-2:
PERSONS IN GROUP QUARTERS - 1980**

PLANNING AREA ¹	Inmate of Mental Hospital		Inmate of Home for the Aged ²		Inmate of Other Institution ³		In College Dormitory		In Other Group Quarters ⁴		Total Population In Group Quarters	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Stockton	27	2.8	106	10.9	682	70.0	84	8.6	75	7.7	974	100
Delta	0	0	0	0	0	0	0	0	462	100	462	100
Thornton	0	0	0	0	0	0	0	0	31	100	31	100
Lodi	0	0	39	35.8	42	38.5	0	0	28	25.7	109	100
Lockeford	18	30.0	0	0	0	0	0	0	42	70.0	60	100
Linden	0	0	0	0	0	0	0	0	21	100	21	100
Escalon	0	0	6	6.1	2	2.0	18	18.4	72	73.5	98	100
Ripon	0	0	0	0	0	0	0	0	0	0	0	0
Manteca/Lathrop	26	2.3	6	.5	1095	97.2	0	0	0	0	1127	100
Tracy	0	0	0	0	1346	100	0	0	0	0	1346	100
Total Unincorporated	71	1.7	157	3.7	3167	74.9	102	2.4	731	17.3	4228	100
Total Cities	55	1.0	2325	40.0	917	15.8	1755	30.2	755	13.0	5807	100
Total County	126	1.3	2482	24.7	4084	40.7	1857	18.5	1486	14.8	10035	100
¹ Unincorporated portion only ² Nursing, convalescent, & rest homes ³ Correctional institutions ⁴ Rooming & boarding houses, farm & nonfarm workers dormitories												
Source: 1980 U.S. Census San Joaquin County Planning Division												

and are generally high density developments. In the unincorporated area, small facilities are the norm, usually housing less than 15 persons. Yearly data provided by the County to the California Department of Finance reveals that the population in these facilities in the unincorporated area has remained fairly constant from 1970 to 1980.

With respect to the second category noted, "Inmates of Mental Hospitals," the 1980 Census reports that there were only 71 persons in this group in the unincorporated area of the County. The number of persons in this group quarter category also has remained constant from 1970 to 1980, based on information provided to the Department of Finance for "persons in homes for the mentally and physically handicapped."

The population in "Other Group Quarters" in the unincorporated area refers primarily to farm workers in dormitory accommodations. In 1980, there were 731 persons in the unincorporated area in this group quarter category, which also includes persons in military barracks. In January of that year the County reported to the Department of Finance that there were 114 persons in military barracks. Subtracting this number from the number of persons in "Other Group Quarters" yields 600+ persons, which is estimated to be the number of farm workers living in group quarter housing for 1980. In 1970, it is estimated from Census data that there were 2,200+ farm workers living in group quarter housing in the unincorporated area of the County. This sharp reduction from 1970 to 1980 in the number of farm workers living in group quarters can be attributed to a large extent to a drop in the migrant, non-resident farm labor population as a result of the increasing mechanization of agriculture.

Race/Ethnicity. The distribution of the population in 1980 by race is shown in Table II.B-3. Nearly three-fourths of the population in the unincorporated area of the County in 1980 was white (not including Spanish). By comparison, approximately two-thirds of the population in the cities collectively was within that group. Recently released 1990 Census data, although limited in its scope, indicates that the white population in the unincorporated area of the County has risen from 82,327 to 83,413, but has dropped to about 70% of the unincorporated population. The black population in the unincorporated area of the County accounted for less than three percent of the total. In the cities collectively, the percentage of blacks was two and a half times greater than that for the unincorporated County. The black population residing in the unincorporated area tended to be concentrated in the unincorporated portion of planning areas with major cities (Stockton, Manteca, and Tracy), except in the unincorporated portion of the Lodi Planning Area which had an extremely small number of people in this racial group. In 1990, the black population had risen from 2,981 to 3,953 and increased from 2.6% of the unincorporated population to 3.2%. The Asian population in the unincorporated areas of the County exceeded the black population by about a thousand people. However, the percentage of Asians in the unincorporated area was only slightly greater than the percentage of blacks (3.5 percent versus 2.6 percent). Although the definition of Asian & Pacific Islander has expanded since the last census, the percentage of Asians in the unincorporated area in 1990 has remained about the same, 3.5 percent, increasing in numbers from 3967 to 4399.

**TABLE II.B-3:
RACE/ETHNICITY - 1980**

PLANNING AREA ¹	White		Black		Indian		Asian		Other		Spanish ²		Total	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Stockton	40239	71.9	1749	3.1	725	1.3	2042	3.7	473	.8	10714	19.2	55942	100
Delta	858	44.7	15	.8	4	.2	148	7.7	36	1.9	858	44.7	1919	100
Thornton	1206	59.9	29	1.5	25	1.2	122	6.1	4	.2	827	31.1	2013	100
Lodi	8903	76.9	36	.3	118	1.0	547	4.7	134	1.2	1842	15.9	11580	100
Lockeford	6284	83.5	29	.4	66	.9	116	1.5	36	.5	997	13.2	7530	100
Linden	2831	83.0	17	.5	6	.2	49	1.4	20	.6	489	14.2	3412	100
Escalon	4213	83.8	2	-	27	.5	18	.4	35	.7	732	14.6	5027	100
Ripon	2329	87.2	1	-	11	.4	6	.2	7	.3	317	11.9	2671	100
Manteca/Lathrop	9996	69.2	570	3.9	251	1.7	834	5.8	129	.9	2668	18.5	14448	100
Tracy	5668	67.5	533	6.4	88	1.0	85	1.0	73	.9	1946	23.2	8393	100
Total Unincorporated	82527	73.1	2961	2.6	1323	1.2	3967	3.5	947	.8	21190	18.8	112935	100
Total Cities	154706	65.3	15463	6.5	2134	.9	15921	6.7	3244	1.4	45375	19.2	236843	100
Total County	237233	67.8	18444	5.3	3457	1.0	19888	5.7	4191	1.2	66565	19.0	349778	100

¹ Unincorporated portion only.

² Spanish Population subtracted from each racial group.

Source: 1980 U.S. Census San Joaquin County Planning Division

Table II.B-3 also shows the concentration of persons describing themselves as being of Spanish origin. It should be noted that this is not a separate racial group, since a person of Spanish origin can be of any racial group. In 1980, this ethnic group made up approximately 19 percent of the total unincorporated population, or nearly one person in five in the unincorporated area described themselves as being of Spanish origin. In 1990, the percentage of those indicating they were Hispanic rose to 25.3 percent of the unincorporated population, going from 21,190 in 1980 to 31,594 in 1990.

Age Characteristics. The distribution of the population by age group is given in Table II.B-4. Although the unincorporated population declined from 1970 to 1980, the number of people 55 and over increased by almost 3,500 people. Expressed in percentages, the percentage of the unincorporated population 55 and over increased from about 18 percent to over 22 percent. A significant portion of this numerical and percentage increase in the 55 and over group can be attributed to the growth in the elderly (i.e., 65 and over) population.

While there was an increase in the 55 and over population, the number of children less than 15 years old declined by nearly 9,300 in the unincorporated area during this period. Although the younger population showed a marked decline, the population 20-34 years of age showed an increase of almost 2,700. This phenomenon of fewer children relative to the child rearing segment of the population is largely attributable to the declining birth rates experienced from 1970 to 1980.

These trends are identifiable in most planning areas, except for the Delta, Thornton, and Lockeford Planning Areas. In the Lockeford Planning Area, the number of children less than 15 years old increased by 300 from 1970 to 1980.

The findings that the population 55 and over increased from 1970 to 1980 and that the number of children less than 15 years old declined from 1970 to 1980 have significant consequences for the housing market both in terms of units needed and the types of units required to house the population.

Occupied Housing Units. The number of occupied housing units in the unincorporated area of the County has shown a slow but steady increase from 1960 to 1985, increasing at an annual percentage rate of .8 percent per year (see Table II.B-5). By comparison, the rate of increase for the cities collectively was 3.5 percent per year. In terms of numbers, occupied housing units increased in the unincorporated area by approximately 3,300 units from 1960 to 1970, 2,100 units from 1970 to 1980, and slightly less than 1,800 units from 1980 to 1985.

The rate of increase in occupied housing units from 1960 to 1985 in the unincorporated area as a whole is not, however, representative of that experienced by a number of planning areas. Lockeford, Linden, and Manteca/Lathrop Planning Areas exhibited rates which were at least twice as great. The key player, as one might expect, in influencing the overall rate for the unincorporated area is the Stockton Planning Area. During the period from 1960 to 1985, the number of occupied housing units in the Stockton Planning Area increased by 300 units, or a rate of increase of only .1 percent per year.

**TABLE II.B-4:
AGE CHARACTERISTICS - 1970, 1980**

PLANNING AREA*	YEAR	Age 0-4		Age 5-9		Age 10-14		Age 15-19		Age 20-24	
		No.	Pct	No.	Pct	No.	Pct	No.	Pct	No.	Pct
Stockton	1970	5673	8.3	6982	10.2	7210	10.5	6649	9.7	4673	6.8
	1980	3880	7.0	3978	7.2	4539	8.2	5155	9.3	4132	7.4
Delta	1970	179	5.5	202	6.2	175	5.4	271	8.3	367	11.3
	1980	142	7.4	129	6.8	100	5.2	199	10.4	250	13.1
Thornton	1970	147	6.9	215	10.1	235	11.1	188	8.9	115	5.4
	1980	157	7.9	146	7.3	173	8.7	173	8.7	142	7.1
Lodi	1970	880	7.9	1149	10.3	1253	11.2	1138	10.2	698	6.3
	1980	692	6.0	830	7.2	966	8.4	1051	9.1	778	6.7
Lockeford	1970	352	6.8	590	11.5	617	12.0	487	9.5	262	5.1
	1980	563	7.5	571	7.6	713	9.5	740	9.9	477	6.4
Linden	1970	237	7.9	284	9.4	320	10.6	305	10.1	179	5.9
	1980	237	7.0	256	7.5	290	8.5	362	10.6	242	7.1
Escalon	1970	352	8.1	451	10.4	507	11.7	490	11.3	269	6.2
	1980	412	8.2	377	7.5	465	9.3	532	10.6	372	7.4
Ripon	1970	199	7.4	241	9.0	329	12.2	294	11.0	174	6.5
	1980	209	7.8	208	7.8	225	8.4	226	8.5	233	8.7
Manteca/Lathrop	1970	1113	8.8	1317	10.4	1554	12.2	1872	14.7	871	6.8
	1980	1023	7.1	1150	8.0	1422	9.9	2209	15.4	1178	8.2
Tracy	1970	528	7.5	670	9.6	814	11.6	835	11.9	603	8.6
	1980	455	5.4	515	6.2	683	8.2	816	9.7	1099	13.1
Total Unincorp.	1970	9660	8.1	12101	10.1	13014	10.8	12529	10.4	8211	6.8
	1980	7770	6.9	8160	7.3	9576	8.5	11463	10.2	8903	7.9
Total Cities	1970	14090	8.3	15899	9.4	16422	9.7	16154	9.5	13826	8.1
	1980	19690	8.4	18339	7.8	18333	7.8	21169	9.0	22398	9.5
Total County	1970	23750	8.2	28000	9.6	29436	10.1	28683	9.9	22037	7.6
	1980	27460	7.9	26499	7.6	27909	8.0	32632	9.4	31303	9.0

* Unincorporated Portion Only.

Source: 1970 & 1980 U. S. Censuses; San Joaquin County Planning Division

**TABLE II.B-4:
AGE CHARACTERISTICS - 1970, 1980 (Continued)**

PLANNING AREA*	YEAR	Age 25-29		Age 30-34		Age 35-44		Age 45-54		Age 55-59	
		No.	Pct	No.	Pct	No.	Pct	No.	Pct	No.	Pct
Stockton	1970	4353	6.3	3653	5.3	7807	11.4	8987	13.1	3768	5.5
	1980	4053	7.3	3774	6.8	6191	11.1	6286	11.3	3686	6.6
Delta	1970	264	8.1	235	7.2	442	13.6	352	10.8	230	7.1
	1980	208	10.9	156	8.2	222	11.6	169	8.9	110	5.8
Thornton	1970	104	4.9	93	4.4	267	12.6	233	11.0	141	6.6
	1980	118	5.9	111	5.6	204	10.2	251	12.6	141	7.1
Lodi	1970	603	5.4	636	5.7	1308	11.7	1473	13.2	587	5.3
	1980	749	6.5	704	6.1	1434	12.4	1422	12.3	835	7.2
Lockeford	1970	299	5.8	296	5.8	660	12.8	642	12.5	272	5.3
	1980	535	7.1	595	7.9	1041	13.9	832	11.1	393	5.2
Linden	1970	170	5.6	174	5.8	376	12.5	352	11.7	173	5.7
	1980	250	7.3	239	7.0	443	13.0	384	11.3	181	5.3
Escalon	1970	264	6.1	226	5.2	507	11.7	537	12.3	240	5.5
	1980	397	7.9	347	6.9	596	11.9	565	11.2	276	5.5
Ripon	1970	162	6.0	128	4.8	298	11.1	388	14.5	139	5.2
	1980	195	7.3	183	6.9	299	11.2	273	10.2	197	7.4
Manteca/Lathrop	1970	682	5.4	690	5.4	1443	11.3	1348	10.9	558	4.4
	1980	894	6.2	902	6.3	1722	12.0	1489	10.4	710	5.0
Tracy	1970	374	5.3	324	4.6	854	12.2	826	11.8	297	4.2
	1980	728	8.7	577	6.9	941	11.2	879	10.5	489	5.8
Total Unincorp.	1970	7275	6.1	6455	5.4	13962	11.6	15174	12.6	6405	5.3
	1980	8127	7.2	7588	6.8	13093	11.7	12550	11.2	7018	6.3
Total Cities	1970	11062	6.5	8936	5.2	18285	10.7	19645	11.5	8757	5.1
	1980	20842	8.9	19093	8.1	24917	10.6	21748	9.3	11442	4.9
Total County	1970	18337	6.3	15391	5.3	32247	11.1	34819	12.0	15162	5.2
	1980	28969	8.3	26681	7.7	38010	10.9	34298	9.9	18460	5.3

* Unincorporated Portion Only

Source: 1970 & 1980 U.S. Censuses; San Joaquin County Planning Division

**TABLE II.B-4:
AGE CHARACTERISTICS - 1970, 1980 (Continued)**

PLANNING AREA*	YEAR	Age 60-64		Age 65+		Total
		No.	Pct	No.	Pct	
Stockton	1970	2946	4.3	5864	8.6	68565
	1980	3169	5.7	6734	12.1	55586
Delta	1970	232	7.1	303	9.3	3252
	1980	71	3.7	151	7.9	1907
Thornton	1970	154	7.3	229	10.8	2121
	1980	126	6.3	251	12.6	1993
Lodi	1970	496	4.5	920	8.3	11141
	1980	683	5.9	1409	12.2	11553
Lockeford	1970	235	4.6	427	8.3	5139
	1980	323	4.3	724	9.6	7507
Linden	1970	140	4.6	307	10.2	3017
	1980	149	4.4	377	11.1	3410
Escalon	1970	196	4.5	311	7.1	4350
	1980	234	4.7	451	9.0	5024
Ripon	1970	106	4.0	225	8.4	2683
	1980	159	6.0	257	9.6	2664
Manteca/Lathrop	1970	430	3.4	803	6.3	12717
	1980	553	3.9	1063	7.4	14315
Tracy	1970	266	3.8	613	8.8	7004
	1980	368	4.4	820	9.8	8370
Total Unincorp.	1970	5201	4.3	10002	8.3	119989
	1980	5835	5.2	12246	10.9	112329
Total Cities	1970	7469	4.4	19674	11.6	170219
	1980	9947	4.2	27095	11.5	235013
Total County	1970	12670	4.4	29676	10.2	290208
	1980	15782	4.5	39341	11.3	347342

* Unincorporated Portion Only

Source: 1970 & 1980 U.S. Censuses; San Joaquin County Planning Division

**TABLE II.B-5:
OCCUPIED HOUSING UNITS - 1960, 1970, 1980, 1985**

PLANNING AREA ¹	1960		1970		1980		1985 (Est)	
	No.	Pct	No.	Pct	No.	Pct	No.	Pct
Stockton	19900	26.7	21201	23.0	19901	16.0	20220	14.4
Delta	540	.7	517	.6	476	.4	490	.3
Thornton	553	.7	578	.6	688	.6	710	.5
Lodi	2827	3.8	3302	3.6	4041	3.2	4260	3.0
Lockeford	1186	1.6	1525	1.7	2461	2.0	2650	1.9
Linden	842	1.1	956	1.0	1110	.9	1210	.9
Escalon	1170	1.6	1337	1.4	1573	1.3	1660	1.2
Ripon	773	1.0	788	.8	895	.7	960	.7
Manteca/Lathrop	2509	3.4	3404	3.7	4085	3.3	4600	3.3
Tracy	1916	2.6	1888	2.0	2379	1.9	2630	1.9
Total Unincorp.	32216	43.2	35496	38.4	37609	30.2	39390	28.0
Total Cities	42441	56.8	56876	61.6	87017	69.8	101490	72.0
Total County	74657	100	92372	100	124626	100	140880	100
¹ Unincorporated Portion Only								
Source: 1960, 1970, 1980 U.S. Censuses. California Department of Finance 1985 County & Cities Estimate (Released 4/26/85). San Joaquin County Planning Division.								

As with the percentage of the County's household population residing in the unincorporated area, the percentage of the County's occupied housing units within the unincorporated area has shown a marked decline from 1960 to 1985. In 1960, this percentage was 43.2 percent. By 1980, it had declined to 30.2 percent. By 1985, this percentage had fallen to 28 percent.

1990 Census figures, while not available for the unincorporated planning areas, were available for the County and show a further decline of the occupied housing units in the unincorporated portion of the County to 23.5 percent. In addition, the number of occupied housing units decreased from 39,390 units in 1985 to 37,157 units in 1990 (see Table I.D-1). This decrease of 2,233 units is largely due to the incorporation of Lathrop in 1989.

Persons Per Household. Persons per household (i.e., persons per occupied housing unit) have shown a steady decline from 1960 to 1980 in the County as a whole (see Table II.B-6). Between 1980 and 1990 this trend reversed to a certain extent, increasing from 2.71 to 2.80. This was not, however, reflected in the unincorporated portion of the County which has continued to see a decrease in the persons per household, going from 2.88 in 1980 to 2.77 in 1990. The cities as whole, on the other hand, showed an increase between 1980 and 1990, going from 2.63 to 2.80, after decades of decline. The persons per household has important implications for housing in terms of the expected number of units needed to house the increase in population.

Owner/Renter Occupied Housing Units. In 1970, two out of three housing units in the unincorporated portion of the County were owner occupied units. By 1980, the percentage of owner occupied units in the unincorporated area had increased to 72% (see Table II.B-7). These numbers are fairly typical of most planning areas. The only exceptions are the Delta and Thornton Planning Areas, two sparsely populated rural planning areas, although here too the percentage of owner occupied units increased significantly from 1970 to 1980. By comparison, the proportion of owner occupied units in the cities collectively declined from 57.5% in 1970 to 55.3% in 1980, indicating that home ownership within the cities during this period became less obtainable or less desirable.

Tenure by Type of Unit. Table II.B-8 shows renter/owner occupancy status by type of unit in 1980. In the unincorporated area of the County and also in the cities collectively, approximately one in four single family units was rented. This statistic is generally higher in planning areas which do not contain major cities. For mobilehomes in the unincorporated area, one in five was rented. Generally, the percentage of mobilehomes which were rented is higher in planning areas without major cities than in the unincorporated area as a whole. In the unincorporated portion of planning areas with major cities the converse is true.

As a source of rental housing, single family units and mobilehomes, which may be considered a class of single family dwelling, together made up almost 80 percent of the total rental housing stock in the unincorporated portion of the County in 1980. By comparison, in the cities collectively the majority of

**TABLE II.B-6:
PERSONS PER HOUSEHOLD - 1960, 1970, 1980, 1990**

PLANNING AREA ¹	1960	1970	1980	1990
Stockton	3.38	3.01	2.75	2.71
Delta	3.33	3.26	3.03	2.55
Thornton	3.59	3.25	2.85	2.57
Lodi	3.39	3.34	2.84	2.74
Lockeford	3.33	3.33	3.02	2.80
Linden	3.17	3.15	3.06	2.99
Escalon	3.54	3.43	3.13	2.97
Ripon	3.47	3.40	2.98	2.88
Lathrop	N/A	N/A	N/A	2.90
Manteca/Lathrop	3.57	3.48	3.23	3.03
Tracy	3.50	3.46	2.97	2.81
Total Unincorporated	3.41	3.20	2.88	2.77
Total Cities	2.95	2.96	2.63	2.80
Total County	3.15	3.04	2.71	2.80
¹ Unincorporated portion only Source: 1960, 1970, 1980 1990 U.S. Censuses; San Joaquin County Planning Division.				

**TABLE II.B-7:
OWNER/RENTER OCCUPIED HOUSING UNITS - 1970, 1980**

PLANNING AREA ¹	OWNER				RENTER				TOTAL			
	1970		1980		1970		1980		1970		1980	
	No.	Pct	No.	Pct	No.	Pct	No.	Pct	No.	Pct	No.	Pct
Stockton	14902	70.3	14489	72.8	6299	29.7	5412	27.2	21201	100	19901	100
Delta	162	31.9	194	40.8	352	68.1	282	59.2	517	100	476	100
Thornton	227	39.3	385	58.0	351	60.7	303	44.0	578	100	688	100
Lodi	2171	65.7	2943	72.8	1131	34.3	1098	27.2	3302	100	4041	100
Lockeford	1088	71.3	1918	77.9	437	28.7	543	22.1	1525	100	2461	100
Linden	629	65.8	775	69.8	327	34.2	335	30.2	956	100	1110	100
Escalon	820	61.3	993	63.1	517	38.7	580	36.9	1337	100	1573	100
Ripon	538	68.3	620	69.3	250	31.7	275	30.7	788	100	895	100
Manteca/Lathrop	2255	66.2	2930	71.7	1149	33.8	1155	28.3	3404	100	4085	100
Tracy	1203	63.7	1743	73.3	685	36.3	636	26.7	1888	100	2379	100
Total Unincorporated	23998	67.6	26990	71.8	11498	32.4	10619	28.2	35496	100	37609	100
Total Cities	32722	57.5	48158	55.3	24154	42.5	38859	44.7	56876	100	87017	100
Total County	56720	61.4	75148	60.3	35652	38.6	49478	39.7	92372	100	124626	100

¹ Unincorporated portion only.

Source: 1970 & 1980 U. S. Censuses; San Joaquin County Planning Division

**TABLE II.B-8:
TENURE BY TYPE OF UNIT - 1980**

PLANNING AREA ¹	OCCUPIED HOUSING UNITS											
	SINGLE FAMILY						TWO FAMILY					
	RENTER		OWNER		TOTAL		RENTER		OWNER		TOTAL	
	No.	Pct	No.	Pct	No.	Pct	No.	Pct	No.	Pct	No.	Pct
Stockton	3958	23.5	12869	76.5	16827	100	235	66.2	120	33.8	355	100
Delta	138	43.4	180	56.6	318	100	17	100.0	0	0.0	17	100
Thornton	231	53.1	204	46.9	435	100	26	72.2	10	27.8	36	100
Lodi	748	24.3	2327	75.7	3075	100	56	64.4	31	35.6	87	100
Lockeford	322	16.8	1599	83.2	1921	100	18	75.0	6	25.0	24	100
Linden	273	28.4	689	71.6	962	100	16	57.1	12	42.9	28	100
Escalon	495	34.2	951	65.8	1446	100	14	36.8	24	63.2	38	100
Ripon	236	30.3	542	69.7	778	100	13	68.4	6	31.6	19	100
Manteca/Lathrop	799	24.7	2436	75.3	3235	100	71	68.9	32	31.1	103	100
Tracy	515	25.5	1504	74.5	2019	100	42	62.7	25	37.3	67	100
Total Unincorporated	7715	24.9	23301	75.1	31016	100	506	65.6	266	34.4	774	100
Total Cities	15284	25.4	44866	74.6	60150	100	2923	85.6	484	14.2	3407	100
Total County	22999	25.2	68167	74.8	91166	100	3431	82.1	750	17.9	4181	100

¹ Unincorporated portion only.

Source: 1980 U. S. Census. San Joaquin County Planning Division.

**TABLE II.B-8:
TENURE BY TYPE OF UNIT - 1980 (Continued.)**

PLANNING AREA ¹	OCCUPIED HOUSING UNITS											
	MULTIPLE FAMILY						MOBILEHOME					
	RENTER		OWNER		TOTAL		RENTER		OWNER		TOTAL	
	No.	Pct	No.	Pct	No.	Pct	No.	Pct	No.	Pct	No.	Pct
Stockton	945	74.6	322	25.4	1267	100	254	17.6	1188	82.4	1442	100
Delta	82	94.3	5	5.7	87	100	54	83.1	11	16.9	65	100
Thornton	21	38.9	33	61.1	54	100	14	9.4	135	90.6	149	100
Lodi	188	69.4	83	30.6	271	100	96	16.3	493	83.7	589	100
Lockeford	113	49.1	117	50.9	230	100	90	31.5	196	68.5	286	100
Union	34	41.5	48	58.5	82	100	12	31.6	26	68.4	38	100
Escalon	23	60.5	15	39.5	38	100	51	71.8	20	28.2	71	100
Ripon	14	32.6	29	67.4	43	100	9	27.3	24	72.2	33	100
Manteca/Lathrop	189	67.3	92	32.7	281	100	88	18.9	378	81.1	466	100
Tracy	38	28.6	95	71.4	133	100	20	12.5	140	87.5	160	100
Total Unincorporated	1647	66.3	839	33.7	2486	100	668	20.9	2611	79.1	3299	100
Total Cities	20375	94.2	1256	5.8	21631	100	341	18.3	1522	81.7	1863	100
Total County	22022	91.3	2095	8.7	24117	100	1029	19.9	4133	80.1	5162	100
¹ Unincorporated portion only. Source: 1980 U. S. Census; San Joaquin County Planning Division.												

renter occupied housing units were duplexes and multiple family units. Single family rental units and mobilehome rental units made up only 40 percent of all renter occupied units in the cities as of 1980.

These findings are not unexpected. Historically, in the unincorporated area of the County, single family units and mobilehomes have been the primary providers of rental housing. Given the need for urban services and facilities in multiple family residential development and given the fact that few places in the County have urban services and facilities, most housing units constructed in the unincorporated portion of the County since 1970 have been single family units and mobilehomes.

Building Permits By Type of Unit. Table II.B-9 provides information on 1990 building permit activity in the County (excluding demolitions) by type of unit. 92.7 percent of these building permits were issued for single family housing with little or no activity for two-family or multi-family units. As expected, most of the building permit activity occurred in the Tracy Planning Area, 43.3 percent, and the Stockton Planning Area, 29.3 percent. Figure II.B-1 shows building permit activity for the last twenty years and helps to illustrate the historical housing market activities of the unincorporated County.

Vacancy Rates. The vacancy rate situation in the unincorporated area of the County improved from 1970 to 1980 in terms of the percentage of vacant units necessary to provide a stable housing market (see Table II.B-10). In the unincorporated area of the County in 1980, the vacancy rate for owner households—the "for sale" vacancy rate—was 2 percent; the vacancy rate for rental households—the "for rent" vacancy rate—was 6.5 percent; the vacancy rate for other vacant units—the "other" vacancy rate—was 4.1 percent; the overall vacancy rate for all units was 7.2 percent. In 1970, the comparable vacancy rates were .7 percent for "for sale" units, 4.9 percent for "for rent" units, 2.4 percent for "other" vacant units, and 4.5 percent for the overall vacancy rate.

According to the California Department of Housing and Community Development (HCD), the desired vacancy rates necessary to provide a stable housing environment are 2 percent for the "for sale" vacancy rate, 6 percent for the "for rent" vacancy rate and 3.9 percent for the "other" vacancy rate. The U.S. Department of Housing and Urban Development (HUD) specifies a 5 percent overall vacancy rate in order to facilitate mobility and an adequate supply of housing.

Although, on the whole, the unincorporated area of the County in 1980 achieved the desired vacancy rates, not all unincorporated portions of Planning Areas shared this distinction. Generally, the unincorporated portions of Planning Areas with major cities had a "for sale" vacancy rate which approached or exceeded the HCD recommended rate of 2 percent. With the exception of the Lockeford Planning Area, planning areas without major cities fell far short of this rate. Similar statements can be made for the "for rent" vacancy rate, although, in this instance, two of the planning areas without major cities—Thornton and Ripon—approached or exceeded the HCD recommended rate of 6 percent. All planning areas had an overall vacancy rate which exceeded, and in most cases significantly exceeded, the HUD vacancy rate of 5 percent. This situation, for the most part, can be attributed to the relatively large number of "other" vacant units, and not to an "overbuilt" housing market.

**TABLE II.B-9:
RESIDENTIAL BUILDING PERMITS BY TYPE OF UNIT**

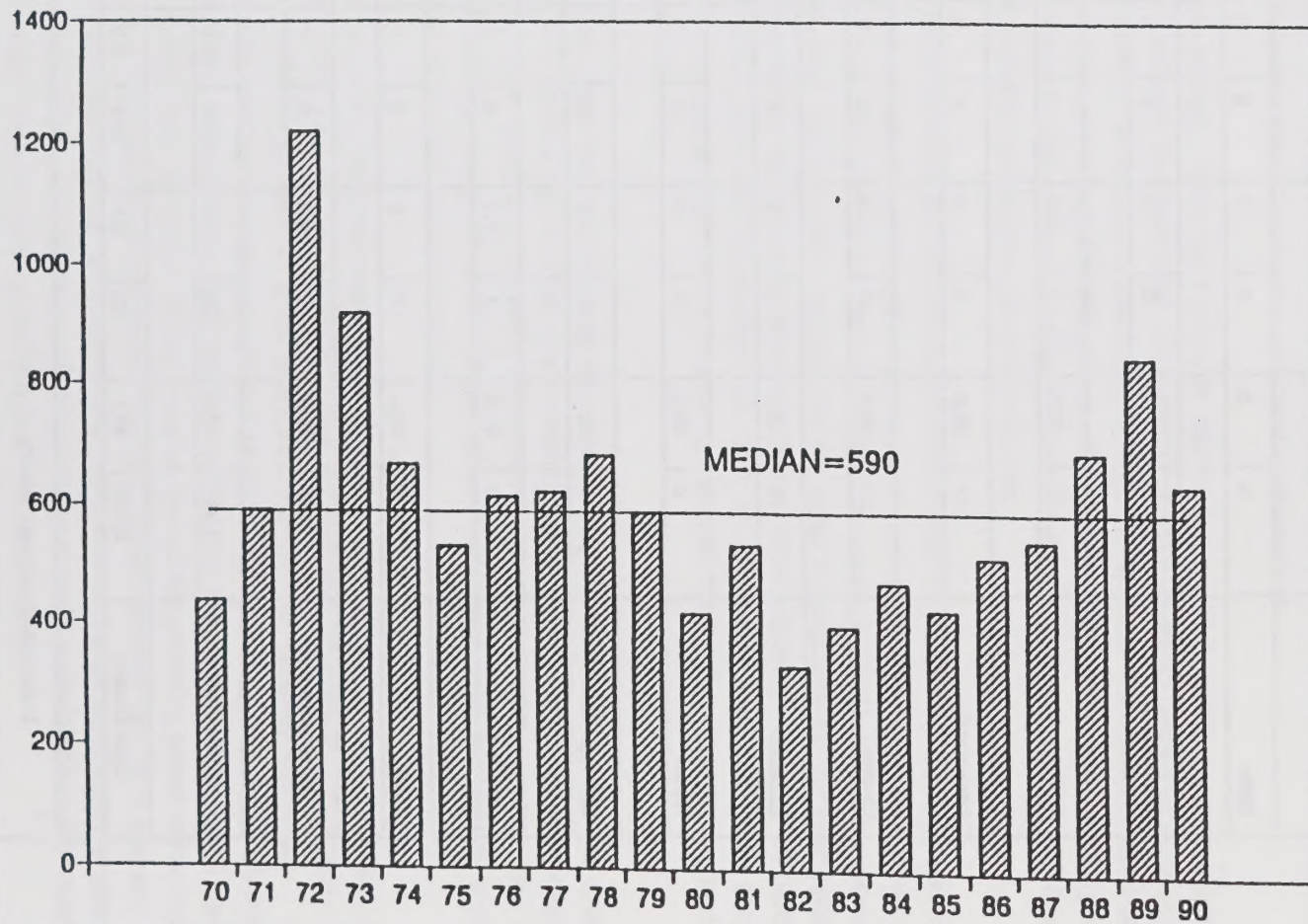
PLANNING AREA ¹	1990									
	SINGLE FAMILY		TWO FAMILY		MULTI FAMILY		MOBILE HOMES		TOTAL UNITS +	
	No.	Pct	No.	Pct	No.	Pct	No.	Pct	No.	Pct
Stockton	179	95.2	0	0	0	0	9	4.8	188	100
Delta	0	0	0	0	0	0	0	0	0	100
Thornton	0	0	0	0	0	0	0	0	0	100
Lodi	49	87.5	1	1.8	0	0	6	10.7	56	100
Lockeford	51	85.0	0	0	0	0	9	15.0	60	100
Linden	13	68.4	0	0	0	0	6	31.6	19	100
Escalon	13	65.0	0	0	0	0	7	35.0	20	100
Ripon	5	83.3	0	0	0	0	1	16.7	6	100
Lathrop	1	50.0	0	0	0	0	1	50.0	2	100
Manteca	8	61.5	1	7.7	0	0	4	30.8	13	100
Tracy	276	99.3	0	0	0	0	2	71.9	278	100
Total Unincorp.	595	92.7	2	0.3	0	0	45	7.0	642	100
Total Cities	1,961	88.9	20	0.9	219	10.0	6	0.3	2,206	100
Total County	2,556	89.7	22	0.8	219	7.7	51	1.8	2,848	100

¹ Unincorporated portion only.

Source: San Joaquin County Planning Division

FIGURE II.B-1

**BUILDING PERMITS IN THE
UNINCORPORATED COUNTY
1970 - 1990**



**TABLE II.B-10:
VACANCY RATES - 1970, 1980**

PLANNING AREA ¹	1970								1980							
	FOR SALE ²		FOR RENT ³		OTHER ⁴		TOTAL ⁵		FOR SALE ²		FOR RENT ³		OTHER ⁴		TOTAL ⁵	
	No.	Pct	No.	Pct	No.	Pct	No.	Pct	No.	Pct	No.	Pct	No.	Pct	No.	Pct
Stockton	119	.8	380	5.5	302	1.4	801	3.6	275	1.9	427	7.3	546	2.6	1248	5.9
Delta	0	0.0	4	1.1	40	7.1	44	7.8	2	1.0	4	1.4	41	7.8	47	9.0
Thornton	1	.4	10	2.8	13	2.2	24	4.0	1	.3	16	5.0	132	15.8	149	17.8
Lodi	13	.6	37	3.2	93	2.7	143	4.2	52	1.7	61	5.3	197	4.5	310	7.1
Lockeford	9	.8	31	6.6	72	4.4	112	6.8	48	2.4	19	3.4	162	6.7	249	9.2
Linden	4	.6	18	5.2	51	5.0	73	7.1	9	1.1	14	4.0	74	6.1	97	8.0
Escalon	1	.1	22	4.1	35	2.5	58	4.2	3	.3	22	3.7	109	6.4	134	7.9
Ripon	0	0.0	9	3.5	20	2.4	29	3.5	3	.5	24	8.0	44	4.6	71	7.3
Manteca/Lathrop	16	.7	62	5.1	85	2.4	163	4.6	102	3.3	96	7.7	201	4.5	399	8.9
Tracy	7	.6	23	3.2	192	9.1	222	10.5	47	2.6	57	8.2	117	4.5	221	8.5
Total Unincorporated	170	.7	596	4.9	903	2.4	1669	4.5	542	2.0	740	6.5	1643	4.1	2925	7.2
Total Cities	261	.8	1620	6.3	626	1.1	2507	4.2	1509	3.0	5015	11.4	1354	1.4	7878	8.3
Total County	431	.8	2216	5.9	1544	1.6	4191	4.3	2051	2.7	5755	10.4	2997	2.2	10803	8.0

¹ Unincorporated portion only.

² Percent of total owner units (i.e., sum of occupied units plus vacant for sale units).

³ Percent of total rental units (i.e., sum of renter occupied units plus vacant for rent units).

⁴ Vacant units not available for sale or rent.

⁵ Percent of total housing stock (i.e., year round units) which is vacant.

Source: 1970 & 1980 U. S. Censuses; San Joaquin County Planning Division

Although the 1990 data for the County planning areas is not yet available, available 1990 Census data indicates that the County as a whole had a vacancy rate of 4.9 percent with 8,118 vacant units. Of those units that were vacant, 3,137 were for rent and 1,627 were for sale.

One further point should be noted. In 1980, the desired vacancy rates were realized in the unincorporated area as a whole despite the fact that most rental housing was provided by single family units and mobilehomes. The conclusion which can be drawn from this is that in 1980 there was a sufficient supply of rental units to accommodate renters who decided to live in the unincorporated area of the County.

Overcrowding. During the period from 1970 to 1980, overcrowding in the unincorporated area declined both in terms of actual numbers and as a percentage of occupied housing units (see Table II.B-11). In 1970, 4,200 units were overcrowded; in 1980 the number of overcrowded units had declined by 1,600 units. As a percentage of occupied housing units, overcrowded housing units went from 11.9 percent in 1970 to 6.9 percent in 1980. This reduction in the number and percent of overcrowded housing units reflects the significant decrease in household size which occurred during this period.

Age of Structure. One indication of the condition of the housing stock is the age of the structures. The older the structure, the more likely it will need rehabilitation or replacement. This is especially true of pre-World War II housing in the unincorporated area because of the absence then of uniform standards for building construction. The relationship between age of housing and substandard condition is discussed in the Housing Needs section. It is useful here, however, to describe the housing stock in terms of its age to gain an understanding of what is at stake: the numbers of older units which must be conserved to provide affordable, standard housing to families and individuals whose economic resources are limited.

Table II.B-12 provides information on the age of the housing stock by age category in 1980. In the unincorporated area of the County over one-third of the housing stock was over 30 years old. In a number of planning areas, this percentage was much greater (i.e., Lodi, 39.6 percent; Linden, 45.1 percent; Escalon, 47.1 percent; Ripon, 56.5 percent). In terms of numbers, there were over 14,000 housing units in the unincorporated area 30 years old and older in 1980. About half of these units were built before 1940.

Households by Income Category. Table II.B-13 shows the distribution of households by income category in 1980. Overall, in the unincorporated portion of the County, over a third (36.8 percent) of all households were categorized as very low or low income households. In terms of numbers, there were over 13,800 such households in 1980.

Further analysis of very low and low income households provides some surprising findings. In the unincorporated area as a whole, less than half (45.8 percent) were renters. By comparison, for the cities collectively, over two-thirds of all very low and low income households were renters. These relationships are shown in Table II.B-14 which provides 1980 data for each income category by status as renter or homeowner. The numbers of very low and low income households are important from a program

**TABLE II.B-11
OVERCROWDED HOUSING UNITS - 1970, 1980**

PLANNING AREA ¹	1970					1980				
	OCCUPIED UNITS	OVERCROWDED ²		SEVERELY OVERCROWDED ³		OCCUPIED UNITS	OVERCROWDED		SEVERELY OVERCROWDED	
		No.	%Occ	No.	%Occ		No.	%Occ	No.	% Occ
Stockton	21201	2232	10.5	591	2.8	19901	1309	6.6	460	2.3
Delta	517	95	18.4	40	7.7	476	58	12.2	17	3.6
Thornton	578	100	17.3	42	7.3	688	87	12.6	46	6.7
Lodi	3302	393	11.9	156	4.7	4041	244	6.0	114	2.8
Lockeford	1525	198	13.0	51	3.3	2461	149	6.1	63	2.6
Udlen	956	128	13.4	68	7.1	1110	79	7.1	27	2.4
Escalon	1337	197	14.7	57	4.3	1573	137	8.7	53	3.4
Ripon	788	95	12.1	27	3.4	895	55	6.1	16	1.8
Manteca/Lathrop	3404	480	14.1	128	3.8	4085	336	8.2	115	2.8
Tracy	1888	292	15.5	107	5.7	2379	144	6.1	58	2.4
Total Unincorporated	35496	4210	11.9	1267	3.6	37609	2596	6.9	969	2.6
Total Cities	56876	4644	8.2	1285	2.2	87017	5307	6.1	2166	2.5
Total County	92372	8854	9.6	2552	2.8	124626	7905	6.3	3135	2.5
¹ Unincorporated Portion Only. ² 1.01 or more persons per room. ³ 1.51 or more persons per room										
Source: 1970 & 1980 U.S. Censuses; San Joaquin County Planning Division.										

**TABLE II.B-12
YEAR STRUCTURE BUILT**

PLANNING AREA ¹	1939 OR EARLIER		1940-1949		1950-1959		1960-1969		1970-1980		TOTAL YEAR ROUND UNITS	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Stockton	2807	13.3	4444	21.1	7031	33.4	3896	18.5	2899	13.7	21077	100
Delta	154	29.0	96	18.1	74	14.0	134	25.3	72	13.6	530	100
Thornton	111	13.3	87	10.4	163	19.6	208	25.0	264	31.7	833	100
Lodi	1095	25.4	614	14.2	546	12.6	756	17.5	1308	30.3	4319	100
Lockeford	549	20.2	296	10.9	326	12.0	495	18.2	1053	38.7	2719	100
Linden	382	31.3	168	13.8	257	21.0	233	19.1	181	14.8	1221	100
Escalon	431	24.8	387	22.3	376	21.7	247	14.2	294	17.0	1735	100
Ripon	361	37.9	177	18.6	134	14.1	113	11.9	167	17.5	952	100
Manteca/Lathrop	785	17.4	506	11.2	622	13.8	1183	26.3	1408	31.3	4504	100
Tracy	453	17.3	396	15.1	511	19.5	500	19.1	757	29.0	2617	100
Total Unincorporated	7128	17.6	7171	17.7	10040	24.8	7765	19.2	8403	20.7	40507	100
Total Cities	15192	16.0	10748	11.3	15835	16.7	17522	18.4	35776	37.6	95073	100
Total County	22320	16.4	17919	13.2	25875	19.1	25287	18.7	44179	32.6	135580	100

¹ Unincorporated portion only.

Source: 1980 U.S. Census. San Joaquin County Planning Division

planning standpoint since they are an indicator of existing housing need. In many instances, these households are burdened by excessive housing payments (i.e., payments for housing which exceed 25 percent of gross monthly income). The extent to which these households were overpaying for housing in 1980 is discussed in the Housing Needs section of the Housing Element. Whether or not overpaying for housing, these households have serious problems with respect to housing affordability, mobility, and choice of housing. Low income may necessitate the renting of accommodations which are substandard or may result in the postponing of needed repairs if the householder is an owner.

Poverty Status. Poverty status is another indicator of housing need. In the unincorporated area as a whole in 1980, approximately 4,100 households, containing 12,200 persons, were below the poverty level. Of these households, 2,900 were families. In terms of total families, nearly one family in ten in the unincorporated area was below the poverty level. The figures for unrelated individuals are even more startling. Of the 10,000+ unrelated individuals residing in the unincorporated area, nearly 2,500 or approximately one in four unrelated individuals, was below the poverty level. These findings are based on the data provided in Table II.B-15.

Housing Costs. Housing has become a less affordable commodity. From 1970 to 1980, the median price of a home in the unincorporated area increased by over 200 percent (212.9 percent) from \$16,300 to \$51,000 (see Table II.B-16). Median family income, on the other hand, increased by about half that percentage (110 percent), from \$9,369 to \$19,649. Generally, in 1980 the median home value was lowest in the unincorporated portions of planning areas with major cities. Between 1980 and 1990, the affordability of housing has continued to decrease. In 1990, the median home value in the county as a whole was \$121,700 and median rent was \$417.

The increase in median rent has been less dramatic than the rise in median home value. During the 1970-80 period, median rent in the unincorporated area went from \$70 to \$164, a rise of 134 percent. This modest percentage increase in median rent relative to the large percentage increase in median home value can be largely attributed to the moderating effect of a relatively large supply of vacant rental housing units in 1980.

While the median price of housing in San Joaquin County is low relative to the Bay Area and other higher cost areas of California, incomes are also lower and increases in the cost of housing have had a significant effect on the ability of County residents to afford housing within their means, particularly those who desire to own a home. Generally, the standard for determining housing affordability used by HUD and by lending institutions is that payment for housing should not exceed 25 percent of gross household income. If a household exceeds this standard, it is considered to be overpaying.

For renters, the percentage of those overpaying for housing in the unincorporated area increased from approximately 44 percent in 1970 to 48 percent in 1980. For homeowners, a comparison of those overpaying for housing between 1970 and 1980 could not be made because data regarding overpayment for housing by owners was not available in 1970. As an alternative, a comparison of families that would

**TABLE II.B-13
HOUSEHOLDS BY INCOME CATEGORY - 1980**

PLANNING AREA ¹	VERY LOW ²		LOW ³		MODERATE ⁴		ABOVE MODERATE ⁵		TOTAL HOUSEHOLDS	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Stockton	4876	24.5	3188	16.0	3804	19.1	8072	40.4	19940	100
Delta	64	13.1	77	15.8	109	22.3	238	48.8	488	100
Thornton	213	31.2	113	16.6	141	20.6	216	31.6	683	100
Lodi	799	19.8	537	13.3	686	17.0	2015	49.9	4037	100
Lockeford	395	16.3	336	13.9	432	17.9	1256	51.9	2419	100
Linden	209	18.9	135	12.2	200	18.1	563	50.8	1107	100
Escalon	265	16.8	245	15.6	287	18.3	775	49.3	1572	100
Ripon	129	13.9	130	14.0	124	13.4	545	58.7	928	100
Manteca/Lathrop	813	19.9	615	15.1	686	16.8	1967	48.2	4801	100
Tracy	349	14.8	355	15.0	463	19.6	1193	50.6	2360	100
Total Unincorporated	8112	21.6	5731	15.2	6932	18.4	16840	44.8	37615	100
Total Cities	22917	26.2	13672	15.6	16064	18.4	34771	39.8	87424	100
Total County	31029	24.8	19403	15.5	22996	18.4	51711	41.3	125039	100

¹ Unincorporated portion only.
² Less than 50 percent of County median: \$8035 or less.
³ 50-80 percent of County median: \$8036 - \$12856.
⁴ 80-120 percent of County median: \$12857 - \$19284.
⁵ 120 percent of County median and above: \$19285 +.
 Source: 1980 U.S. Census; San Joaquin County Planning Division

**TABLE II.B-14
HOUSEHOLD BY INCOME CATEGORY RENTING OR OWNING - 1980**

PLANNING AREA ¹	VERY LOW ²						LOW ³					
	RENT		OWN		TOTAL		RENT		OWN		TOTAL	
	No.	Pct	No.	Pct	No.	Pct	No.	Pct	No.	Pct	No.	Pct
Stockton	1897	49.0	1971	51.0	3868	100	1058	39.4	1628	60.6	2686	100
Delta	10	38.5	16	61.5	26	100	13	76.5	4	23.5	17	100
Thornton	82	71.3	33	28.7	115	100	41	51.9	38	48.1	79	100
Lodi	269	57.5	199	42.5	468	100	156	53.6	135	46.4	291	100
Lockeford	91	53.5	79	46.5	170	100	58	33.9	113	66.1	171	100
Linden	37	52.9	33	47.1	70	100	43	64.2	24	35.8	67	100
Escalon	32	28.0	82	72.0	114	100	49	42.6	66	57.4	115	100
Ripon	25	35.7	45	64.3	70	100	29	43.9	37	56.1	66	100
Manteca/Lathrop	239	50.4	235	49.6	474	100	164	41.5	231	58.5	395	100
Tracy	62	32.8	127	67.2	189	100	60	33.5	119	66.5	179	100
Total Unincorporated	2744	49.3	2820	50.7	5564	100	1671	41.1	2395	58.9	4066	100
Total Cities	14524	71.7	5613	28.3	19867	100	7762	61.8	4805	38.2	12567	100
Total County	16988	66.8	8433	33.2	25431	100	9433	56.7	7200	43.3	16633	100

- ¹ Unincorporated Portion Only.
² Less than 50 percent of County median: \$8035 or less.
³ 50-80 percent of County median: \$8036 - \$12856.
⁴ 80-120 percent of County median: \$12857 - \$19284.
⁵ 120 percent of County median and above: \$19285.

Source: 1980 U.S. Census, San Joaquin County Planning Division.

**TABLE II.B-16:
HOUSING VALUE, RENT, AND FAMILY INCOME - 1970, 1980**

PLANNING AREA ¹	MEDIAN HOME VALUE			MEDIAN RENT			MEDIAN FAMILY INCOME		
	1970	1980	% OF CHANGE	1970	1980	% OF CHANGE	1970	1980	% OF CHANGE
Stockton	\$15600	\$45000	188.5	\$73	\$165	126.0	\$ 9582	\$18395	92.0
Delta	\$19600	\$70500	259.7	\$67	\$184	174.6	\$ 6805	\$22981	237.7
Thornton	\$12000	\$42500	254.1	\$58	\$ 58	0.0	\$ 6986	\$16168	131.4
Lodi	\$19200	\$67200	250.0	\$61	\$155	154.0	\$ 9472	\$21605	128.1
Lockeford	\$19100	\$76400	300.0	\$73	\$187	156.0	\$ 9445	\$22116	134.2
Linden	\$20000	\$73600	268.0	\$65	\$147	126.2	\$ 7797	\$21990	182.0
Escalon	\$16300	\$78400	381.0	\$77	\$161	109.1	\$ 8582	\$20487	138.7
Ripon	\$18000	\$78800	337.8	\$77	\$159	106.5	\$10099	\$24441	142.0
Manteca/Lathrop	\$17400	\$59400	241.4	\$80	\$182	127.5	\$ 9686	\$20229	108.8
Tracy	\$16600	\$72700	338.0	\$62	\$158	154.8	\$ 8609	\$21114	145.2
Total Unincorporated	\$16300	\$51000	212.9	\$70	\$164	134.3	\$ 9369	\$19649	109.7
Total Cities	\$17600	\$57900	229.0	\$85	\$190	123.5	\$ 9761	\$18859	93.2
Total County	\$16500	\$54500	230.3	\$84	\$186	121.4	\$ 9602	\$19120	99.1

¹ Unincorporated portions only.

Source: 1970 & 1980 U. S. Censuses; San Joaquin County Planning Division.

have been unable to afford a new home in 1970 and in 1980 is provided below. All families counted in the 1970 and 1980 U.S. Censuses are included in this analysis, whether or not they owned a home at the time the Census was conducted. In 1970 the base price of a new single family dwelling containing 1,000 square feet was approximately \$20,000. By 1980 the base price had increased (by conservative estimates) to \$50,000. In 1970 the prevailing mortgage rate was 7½ percent; in 1980 the lowest rate charged was 11½ percent. Table II.B-17 shows the number of families that would have been unable to afford a new home in 1970 and in 1980, given the assumptions specified in the table. In 1970 in the unincorporated area of the County, almost half (45.8 percent) of all families would have been unable to afford a new home. By 1980, the situation had worsened so that new home ownership was out of the reach of almost two thirds (65.9 percent) of all families in the unincorporated area.

In both 1970 and 1980, all very low income and low income families would have been excluded from new home ownership, on the basis of income alone. Over 90 percent of moderate income families in 1970 and all moderate income families in 1980 would have been unable to afford a new home. If the standard for affordability discussed above is used, new market rate housing is not an obtainable goal for these families unless they receive some form of housing subsidy or make a large initial down payment.

While it can be argued that more families would have been able to afford a new home if a larger down payment is assumed, this exercise is useful in that it points out the erosion in (owner) housing affordability from 1970 to 1980. It also underscores the importance of conserving the stock of existing modestly priced housing since these units are generally lower in price than comparable new units.

3. HOUSING NEEDS

As assessment of the housing needs of all economic segments of the community is a prerequisite for the development of policies and programs which will address housing problems.

Immediate Housing Needs. Immediate housing needs are considered here in terms of affordability, overcrowding, substandard housing, and the housing needs of special groups, and are discussed below.

Affordability. The previous section on housing costs brought out the fact that County residents were worse off in 1980 than they were in 1970 relative to their ability to afford shelter. Housing "affordability" relates to the cost of owning or renting a housing unit relative to the amount of income one has available to pay for it. In the case of homeownership, affordability includes not only the house's price, but also the household's ability to make the down payment and monthly payments. In the case of renting, affordability includes the monthly rent plus initial deposits which typically include the last month's rent.

The situation in San Joaquin County mirrors a statewide trend in which significant numbers of California citizens, especially low income citizens, are finding it difficult to obtain adequate housing. A study by the Senate Office of Research indicates that overall, housing production in the state is meeting current and

**TABLE II.B-17:
FAMILIES UNABLE TO AFFORD A NEW HOME - 1970, 1980**

PLANNING AREA ¹	1970 ²		1980 ³	
	No.	% Total Families	No.	% Total Families
Stockton	7851	43.8	10970	69.9
Delta	254	63.2	219	61.7
Thornton	304	63.7	429	78.1
Lodi	541	44.4	1954	58.5
Lockeford	627	45.7	1217	60.0
Linden	487	57.4	529	57.3
Escalon	917	51.6	828	62.7
Ripon	300	43.6	414	53.6
Manteca/Lathrop	1303	43.1	2257	64.8
Tracy	868	51.6	1240	63.2
Total Unincorporated	13452	45.8	19877	65.9
Total Cities	18969	43.2	42223	68.5
Total County	32421	44.2	62100	67.6

¹ Unincorporated portion only.

² Assumptions: New Single family home; 5 percent down payment; 30 year fixed rate mortgage at 7 ½ percent interest; \$20,000 cost; monthly payment for principal & interest & taxes equal to 2 ½ percent of market value; insurance equal to \$96 annually; total monthly payment not to exceed 25 percent of income.

³ Assumptions: New Single family home; 30 year fixed rate mortgage at 11 ½ percent interest; \$50,000 cost; monthly payment for principal & interest & taxes equal to one percent of market value; insurance equal to \$204 monthly; total monthly payment not to exceed 25 percent of income.

Source: 1970 & 1980 U. S. Census; San Joaquin County Planning Division.

projected housing needs; however, there is a shortage of affordable housing units. The study concludes that the production of housing units affordable to low-income households is lagging far behind the demand for such housing. The high cost of housing and the scarcity of jobs is making it more difficult for many to follow the traditional ladder of economic success. This is leading to social, economic, and ethnic segregation and the danger of developing a "two-tiered" society of haves and have-nots. Within the state, only 16% of the needed low-income housing was being built. The majority of homes for sale in California are in a price range unreachable by all households except those in the higher-income bracket. In 1988, the median home prices were 5.0 times the median income; this compares to the usual norm for purchasing a home of two to two-and-one-half times a person's income. Rent increases have also risen much faster than household incomes and many low-income renters pay significantly more than the 25% to 30% of income normally allocated for housing. In San Joaquin County, it is not unusual for 50 to 80 percent of a family's income to go to housing.

There are five major causes contributing to the lack of affordable housing: rapid population growth, loss of a continuing federal support for housing, expiration of previously funded federal housing subsidies, inability of builders to make a profit, and local opposition to the development of low-income housing.

San Joaquin County has recognized the difficulty many families face in trying to obtain affordable housing. In an effort to help alleviate the situation, the County has made provisions for second unit dwellings for the elderly, permits mobile homes on all residential parcels, and has special provisions for farm labor mobile homes.

Although many families cannot afford to purchase new homes because of their price, San Joaquin County has a large supply of older homes, many of which can be purchased at "fixer-upper" prices. New homes for the more affluent have played an important role in providing affordable homes by allowing less expensive housing to come on the market when families who "move-up" in the housing market sell their current homes. This process is referred to as "filtering" and has proven effective at helping to provide affordable housing.

An important indicator of housing affordability is the percentage of residents who have to overpay for housing. In 1980, there were approximately 3,300 low income renters and very low income renters combined in the unincorporated portion of the County who were burdened by excessive payments for housing (i.e., payments exceeding more than 25 percent of gross household income). These renters accounted for 90 percent of all renters overpaying for rental accommodations in the unincorporated area of the County (see Table II.B-18). Most lower income renters overpaying for shelter in the County were located in the incorporated cities. Approximately one out of six lower income renters overpaying for housing was located in the unincorporated area.

With respect to homeowners burdened by excessive payments for housing in the unincorporated area of the County, over 2,100 were in the very low or low income groups (see Table II.B-19). These homeowners accounted for approximately half of all owners overpaying for housing in the unincorporated

area. Surprisingly, in the Tracy Planning Area, the number and percentage of very low and low income owner households overpaying for housing was relatively small, 45 homeowners or 16.6 percent of total homeowners. Overcrowding is also an indication of a rental housing affordability gap. Doubling up in rental units is a method of reducing the housing expense. This can result in unsafe and substandard living conditions.

Table II.B-20 provides a different prospective on affordability. The table indicates the percentage of households overpaying for housing by tenure in 1980. For very low income households in the unincorporated area, nearly 85 percent of renters and over half of the homeowners were burdened by excessive payments for housing. For low income households, the situation was somewhat improved. A little over half of the renters and less than a third of the homeowners spent more than 25 percent of their gross income on housing. These statistics indicate, not surprisingly, that if you are poor, there is a much greater likelihood that you will be burdened by excessive payments for housing than if you are of moderate or above moderate income.

Overcrowding By Tenure. In the unincorporated area of the County in 1980, there were nearly 2,600 units which were overcrowded. Approximately 1,000 of these units were severely overcrowded (see Table II.B-21). In terms of tenure, there were more renter over-crowded units than owner overcrowded units, although this difference was not significant. By contrast, for the cities collectively, approximately two thirds of the overcrowded units were renter occupied. With respect to severely overcrowded units in the unincorporated area, approximately six out of ten were renter occupied.

Substandard Housing Units. As a part of the County's Community Development Program in 1972-73 a field survey was conducted to determine the condition of housing for selected areas of the County. Over 32,000 units were examined and coded using a system developed jointly by San Joaquin County, the City of Stockton, and the City of Tracy. While the reported numbers of housing units in various condition categories have undoubtedly changed since 1972, some of the findings of the condition survey still have validity. In particular, the condition survey found that, of the 7,300+ pre-1940 housing units inspected in the unincorporated area, almost 97 percent had varying degrees of structural deficiency and, consequently, were considered substandard. Of these substandard units, 64 percent were judged economically suitable for rehabilitation.

In order to obtain a more current estimate of substandard housing units in the unincorporated area, the pre-1940 housing units identified in the 1980 Census were "survived" to 1985 (based on a 1970 - 1980 rate of loss) and the above percentages were then applied. By using this technique, Table II.B-22 was developed.

Table II.B-22 shows that as of 1985 there were nearly 6,100 substandard units in the unincorporated area of the County. What this means is that one out of seven units in the unincorporated area in 1985 was considered to be substandard. Of this number, approximately 3,900 could be rehabilitated, while 2,200 units need to be replaced.

**TABLE II.B-18:
RENTER HOUSEHOLDS PAYING 25 PERCENT OF INCOME FOR HOUSING BY INCOME CATEGORY - 1980**

PLANNING AREA ¹	VERY LOW ²		LOW ³		MODERATE ⁴		ABOVE MODERATE ⁵		TOTAL OVERPAYING	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Stockton	1614	65.8	600	24.5	210	8.6	28	1.1	2452	100
Delta	4	66.7	2	33.3	0	0	0	0	6	100
Thornton	54	78.3	15	21.7	0	0	0	0	69	100
Lodi	230	70.4	75	22.9	22	6.7	0	0	327	100
Lockeford	79	66.9	22	18.6	17	14.4	0	0	118	100
Linden	29	70.7	12	29.3	0	0	0	0	41	100
Escalon	27	36.0	30	40.0	18	24.0	0	0	75	100
Ripon	21	60.0	10	28.6	4	11.4	0	0	35	100
Manteca/Lathrop	220	56.7	104	26.8	46	11.9	18	4.6	388	100
Tracy	50	61.7	27	33.3	4	4.9	0	0	81	100
Total Unincorporated	2329	64.8	897	25.0	321	8.9	46	1.3	3593	100
Total Cities	12265	63.9	4690	24.4	1966	10.3	263	1.4	19184	100
Total County	14594	64.1	5587	24.5	2287	10.0	309	1.4	22777	100

¹ Unincorporated portion only.

² Less than 50 percent of County median: \$8035 or less.

³ 50-80 percent of County median: \$8036 - \$12856.

⁴ 80-120 percent of County median: \$12857 - \$19284.

⁵ 120 percent of County median and above: \$19285.

Source: 1980 U.S. Census. San Joaquin County Planning Division

**TABLE II.B-19:
OWNER HOUSEHOLDS PAYING 25 PERCENT OR MORE OF INCOME FOR HOUSING BY INCOME CATETORY - 1980**

PLANNING AREA ¹	VERY LOW ²		LOW ³		MODERATE ⁴		ABOVE MODERATE ⁵		TOTAL OVERPAYING	
	No.	Pct	No.	Pct	No.	Pct	No.	Pct	No.	Pct
Stockton	988	41.4	440	18.5	455	19.1	502	21.0	2328	100
Delta	7	31.8	4	18.2	0	0.0	11	50.0	22	100
Thornton	7	43.8	5	31.2	4	25.0	0	0.0	16	100
Lodi	125	29.1	50	11.6	81	18.8	174	40.5	430	100
Lockeford	45	12.4	60	16.5	109	29.9	150	41.2	364	100
Linden	12	26.7	0	0.0	15	33.3	18	40.0	45	100
Escalon	65	45.4	25	17.5	18	12.6	35	24.5	143	100
Ripon	23	37.7	12	19.7	13	21.3	13	21.3	61	100
Manteca/Lathrop	122	27.0	88	19.5	90	19.9	152	33.6	452	100
Tracy	35	12.9	10	3.7	37	13.6	190	69.8	272	100
Total Unincorporated	1429	34.1	694	16.6	822	19.6	1245	29.7	4190	100
Total Cities	3066	29.1	1834	17.4	2313	21.9	3328	31.6	10541	100
Total County	4495	30.5	2528	17.2	3135	21.3	4573	31.0	14731	100

- ¹ Unincorporated portion only.
² Less than 50 percent of County median: \$8035 or less.
³ 50-80 percent of County median: \$8036 - \$12856.
⁴ 80-120 percent of County median: \$12857 - \$19284.
⁵ 120 percent of County median and above: \$19285.

Source: 1980 U. S. Census; San Joaquin County Planning Division.

**TABLE II.B-20:
PERCENT OF TOTAL RENTER AND OWNER HOUSEHOLDS OVERPAYING FOR HOUSING BY INCOME CATEGORY - 1980**

PLANNING AREA ¹	VERY LOW ²		LOW ³		MODERATE ⁴		ABOVE MODERATE ⁵		TOTAL	
	Renter	Owner	Renter	Owner	Renter	Owner	Renter	Owner	Renter	Owner
Stockton	85.1	50.1	56.7	27.0	22.5	20.5	3.3	8.4	51.7	20.2
Delta	40.0	43.8	15.4	100	0.0	0.0	0.0	17.5	8.5	26.5
Thornton	65.9	21.2	36.6	13.2	0.0	13.8	0.0	0.0	36.5	12.1
Lodi	85.9	62.8	48.1	37.0	15.2	32.1	0.0	18.0	42.2	27.7
Lockeford	86.8	57.0	37.9	53.1	37.0	46.8	0.0	23.5	45.0	34.2
Linden	78.4	36.4	27.9	0.0	0.0	18.3	0.0	6.9	33.1	11.3
Escalon	84.4	79.3	61.2	37.9	29.0	28.1	0.0	16.5	36.9	33.7
Ripon	84.0	51.1	34.5	32.4	16.0	36.1	0.0	8.7	31.8	55.5
Manteca/Lathrop	92.1	51.9	63.4	38.1	26.6	30.2	11.4	13.7	52.9	24.1
Tracy	80.6	27.6	45.0	8.4	5.0	17.7	0.0	25.5	27.8	22.6
Total Unincorporated	84.9	50.7	53.7	29.0	20.9	24.0	3.0	12.3	47.9	22.2
Total Cities	86.0	54.6	60.4	38.2	27.2	31.4	3.6	13.7	52.6	25.1
Total County	85.9	53.3	59.2	35.1	26.1	29.1	3.5	13.3	51.8	24.2

- ¹ Unincorporated portion only.
² Less than 50 percent of County median: \$8035 or less.
³ 50-80 percent of County median: \$8036 - \$12856.
⁴ 80-120 percent of County median: \$12857 - \$19284.
⁵ 120 percent of County median and above: \$19285.

Source: 1980 U. S. Census; San Joaquin County Planning Division.

**TABLE II.B-21:
OVERCROWDING BY TENURE - 1980**

PLANNING AREA ¹	OVERCROWDED UNITS ²						SEVERELY OVERCROWDED ³					
	RENTER		OWNER		TOTAL		RENTER		OWNER		TOTAL	
	No.	Pct	No.	Pct	No.	Pct	No.	Pct	No.	Pct	No.	Pct
Stockton	654	50.0	655	50.0	1309	100	280	60.9	180	39.1	460	100
Delta	50	86.2	8	13.8	58	100	16	94.1	1	5.9	17	100
Thornton	62	71.3	25	28.7	87	100	33	71.7	13	28.3	46	100
Lodi	143	58.6	101	41.4	244	100	78	68.4	36	31.6	114	100
Lockeford	65	43.6	84	56.4	149	100	30	47.6	33	52.4	63	100
Linden	54	68.4	25	31.6	79	100	23	85.2	4	14.8	27	100
Escalon	98	71.5	39	28.5	137	100	44	83.0	9	17.0	53	100
Ripon	33	60.0	22	40.0	55	100	11	68.8	5	31.2	16	100
Manteca/Lathrop	152	45.2	184	54.8	336	100	53	46.1	62	53.9	115	100
Tracy	77	53.5	67	46.5	144	100	31	53.4	27	46.6	58	100
Total Unincorporated	1388	53.4	1210	46.6	2598	100	599	61.8	370	38.2	969	100
Total Cities	4845	61.3	3060	38.7	7905	100	2160	68.9	975	31.1	3135	100
Total County	3457	65.1	1850	34.9	5307	100	1561	72.1	805	27.9	2166	100

- ¹ Unincorporated portion only.
² 1.01 or more persons per room.
³ 1.51 or more persons per room
Source: 1980 U. S. Census. San Joaquin County Planning Division.

Housing Needs of Special Groups. In San Joaquin County, there are populations with critical housing needs. These groups include the elderly, households headed by women, large families, the handicapped or disabled, the homeless, and farmworkers. The housing needs of these groups are discussed below.

The Elderly. The elderly (i.e., those 65 and over) have special housing needs. This is the largest single "special" group. The housing needs of this group are based on a number of factors: age, health, economic status, family arrangement, and homeownership. Particular needs for the elderly include smaller and more efficient housing, barrier-free and accessible housing, and a wide variety of housing with health care and/or personal services. In 1980, there were approximately 7,900 households in the unincorporated portion of the County with a householder 65 and over (see Table II.B-23). Of these, over 1,550 (19.7 percent) rented. One out of nine households with a householder 65 and over was below the poverty level. Outside of the Stockton Planning Area, the largest concentrations of elderly households occurred in the Lodi (892), Manteca (629), Tracy (521), and Lockeford (455) planning areas.

The elderly are unique in that not only do many have housing problems, but that there are also those that are "overhoused," living alone or as couples, in 3 or 4 bedroom houses which are too large for them to maintain adequately.

Female Headed Households. According to DHCD (State Department of Housing and Community Development) and the National Low Income Housing Coalition's Women and Housing Task Force, the female headed household group is probably the group with the most extensive housing needs and is disproportionately affected by the current housing situation. This housing need is exacerbated by a lack of adequate and affordable child care which would enable the mother to pursue ways of increasing her earning capacity. With 1989 child care costs in San Joaquin County averaging about \$70 per child per week, few women in this group are able to work and care for their children.

In California, two-thirds (66%) of the poor families with children that rent are in this group. In the unincorporated area of the County, the number of families headed by women has increased by almost a fourth from 1970 to 1980 (Table II.B-23). In 1980, the number of households headed by women in the unincorporated area was over 3,100. Of this total almost a third, 932 households, were below the poverty level (see Table II.B-23). These 932 households represent a disproportionate number of households below the poverty level. While households headed by women made up less than 10 percent (8.3 percent) of total households in 1980 in the unincorporated area, they accounted for almost a fourth (22.8 percent) of all households below poverty level. This is a problem that has been continually increasing in size over the past years.

Large Families. Large families (i.e., families with five or more persons) have obvious needs for large units to prevent overcrowding. Unfortunately, Census and other data are not available which document this group's housing needs in terms of the degree of overcrowding, the extent

**TABLE II.B-22:
SUBSTANDARD HOUSING UNITS - 1985**

PLANNING AREA ¹	UNITS UNSUITABLE FOR REHABILITATION	UNITS IN NEED OF REPLACEMENT	TOTAL SUBSTANDARD UNITS
Stockton	1528	848	2376
Delta	68	38	106
Thornton	48	26	74
Lodi	624	346	970
Lockeford	310	172	482
Linden	208	115	323
Escalon	217	121	338
Ripon	215	120	335
Manteca/Lathrop	431	239	670
Tracy	244	135	379
Total Unincorporated	3893	2160	6053
¹ Unincorporated portions only. Source: 1970 & 1980 U. S. Censuses; San Joaquin County Planning Division.			

**TABLE II.B-23:
ELDERLY HOUSEHOLDS AND FEMALE-HEADED HOUSEHOLDS - 1980**

PLANNING AREA ¹	ELDERLY HOUSEHOLDS			FEMALE HEADED HOUSEHOLDS		
	TOTAL HOUSEHOLDS	ELDERLY HOUSEHOLDS BELOW POVERTY LEVEL		TOTAL HOUSEHOLDS	FEMALE HEADED HOUSEHOLDS BELOW POVERTY LEVEL	
		No.	% Total Elderly Households		No.	% Total Female Households
Stockton	4429	470	10.6	2062	631	30.6
Delta	63	7	11.1	17	7	41.2
Thornton	209	12	5.7	49	20	40.8
Lodi	892	122	13.7	256	83	32.4
Lockeford	455	53	11.6	116	26	22.4
Linden	272	52	19.1	55	13	23.6
Escalon	312	27	8.7	73	18	24.7
Ripon	103	0	-	44	18	40.9
Manteca/Lathrop	629	103	16.4	324	90	27.7
Tracy	521	26	5.0	142	26	18.3
Total UnIncorporated	7885	872	11.1	3138	932	29.7
Total Cities	17209	2083	12.1	10125	3606	35.6
Total County	25094	2955	11.8	13263	4538	34.2
¹ Unincorporated portions only. Source: 1980 U. S. Census; San Joaquin County Planning Division.						

of overpayment for housing, or the number living below poverty. Information on the distribution of large families within the County, however, is available. Table II.B-24 shows that in 1980 there were 5,300 large families residing in the unincorporated area. Of these, over 1,600 (30.7 percent) were renters. Overall, in the unincorporated area, one out of six families was classified as a large family.

Handicapped/Disabled. The handicapped/disabled population covers a broad range of disabilities from the physically disabled, including the blind and the deaf, to the developmentally disabled and the chronically mentally ill. Each has a need of housing which compensates for their individual handicaps and takes advantage of their unique abilities. As a result of various rehabilitation programs, many are now able and ready to participate actively in the community to some degree. Many, however, are poor in addition to requiring special design consideration such as single-level units, availability of services, group living opportunities, and proximity to transit and other design and location criteria. While new regulations adopted by the State require all ground floor units of new apartment complexes with 5 or more units to be accessible to persons with disabilities, single-family units have no accessibility requirements.

Data showing the housing presently available to meet the needs of the handicapped/disabled is not available. Census data, however, is available which provides some indication of the size and distribution of this group on the basis of the number of persons 16 and over prevented from working. Table II.B-24 shows that in 1980 there were over 4,400 persons residing in the unincorporated area who were prevented from working because of a mental/physical disability. Outside of the Stockton Planning Area, the planning areas with the largest number of handicapped/disabled persons were the Manteca (456), Lodi (376), Lockeford (253), and Tracy (220) Planning Areas.

Homeless. Besides providing a refuge from the elements, a home provides many intangible benefits such as emotional security, a safe haven to raise a family, and a solid foundation for pursuing a family's social goals. Today, many are without these benefits or the basic need any human being has to simple protection from the elements. During the 1980s, there was a tremendous increase in the number of homeless persons found not only in shelters but also in police station lobbies, emergency rooms of hospitals, camp sites, parked cars, all-night movie theaters, bus stations, airport terminals, hallways, alleys, abandoned buildings, caves, along river banks, and under bridges. Many uncounted homeless are also existing by going from one friends house to another friends house for brief periods of time until they are no longer welcome and are forced onto the street. Homelessness seems to have become a permanent fixture of our society. "Rural as well as urban communities in California are affected by large numbers of homeless persons" with a "growing number of homeless persons migrating from urban to rural areas, particularly to the San Joaquin Valley."¹

**TABLE II.B-24:
LARGE FAMILIES AND HANDICAPPED/DISABLED PERSONS - 1980**

PLANNING AREA ¹	LARGE FAMILIES		HANDICAPPED/DISABLED	
	TOTAL	% TOTAL FAMILIES	TOTAL	% TOTAL POPULATION
Stockton	2425	15.9	2790	5.0
Delta	78	21.0	21	1.1
Thornton	100	18.7	72	3.6
Lodi	488	14.8	376	3.3
Lockeford	371	18.0	253	3.4
Linden	197	21.2	41	1.2
Escalon	283	21.3	134	2.7
Ripon	134	18.1	70	2.6
Manteca/Lathrop	832	23.8	456	3.2
Tracy	392	19.9	220	2.6
Total Unincorporated	5300	17.7	4433	3.9
Total Cities	9464	15.5	7609	3.2
Total County	14764	16.2	12042	3.5

¹ Unincorporated only.

Source: 1980 U. S. Census; San Joaquin County Planning Division

Not all homeless people are the same but fall under several categories: the mentally ill, alcohol and drug users, vagrants, elderly, runaways and abandoned youths, single women with children who are often fleeing domestic violence, and individuals and families who have recently lost jobs and are unable make ends meet, thus also losing their homes, as well as the working poor, those with jobs but whose income is too small to afford housing. Although each category has different specific needs, for all, the most urgent need is for emergency shelter and case management (i.e., help with accessing needed services). For many, transitional housing and long term rental assistance and/or greater availability of low income rental units is also needed.

Even though the cost of providing shelters for the homeless is great, not providing shelters is also very costly to the community as well as the individuals. The costs for such public services as law enforcement and medical care, particularly emergency treatment, rise with increased homelessness. The police are often taken from more serious crimes to deal with the homeless. Many health care problems could be avoided or kept on a manageable level, not requiring emergency care, with proper shelter. The presence of the homeless discourage many people from patronizing some businesses, leading to business losses and loss of tax revenue. There is also the emotional toll not only to the homeless, but also to other members of society who suffer from the unavoidable knowledge that there are fellow human beings, many of whom are children, in dire need of food, clothing, and shelter. Finally, there are the undetermined costs that will arise when a generation of homeless children grow to adulthood without even a minimal education or sense of belonging to or having any responsibility for a community.

It is estimated that in California alone, there are between 150,000 to 250,000 homeless, many of whom are families with children and the working poor. In the United States, it is estimated there are up to 2 million homeless at any given time during the year. A study conducted under the auspices of the County's Mental Health services in 1986-87 indicated that the number of homeless, individuals and families, in the County is approximately .55% of the total population; families constitute over 30% of the number of homeless. Applying these percentages to the 1990 County population produces a homeless population of 2,650, of which approximately 800 are families; this figure represents an average of those who are homeless on any given night. A study focusing on the needs of homeless families confirmed that the number of homeless families is growing faster than any other segment of the homeless population. An ever increasing number of children are being added to the ranks of the homeless.

The 1990 Census figures show 816 homeless in emergency shelters and 106 homeless who were visible on street locations in San Joaquin County as a whole with 574 in Stockton, 204 in Lodi, 102 in French Camp, but only 8 in Manteca and 11 in Tracy. It is felt, however, that these numbers are much too low. Many homeless such as those receiving General Relief or Temporary Assistance were not counted. Even those staying at the Rescue Mission were not counted. It is, therefore, felt that the County's figures are more accurate.

Two other points concerning the number of homeless should be noted. The first is that an estimated 85% to 90% of the homeless in the County are located in the Stockton area, or have moved there from elsewhere in the County. The second point is that updates of studies on the homeless continue to forecast that the percentage of homeless will increase as the population of the County increases. There has been a tremendous increase in the number of homeless recently with an increase of five to fifteen percent per year with the number of homeless expected to reach five thousand to six thousand in the next ten years.

Local governments and private charities, both with limited resources, have been overwhelmed by the magnitude of the problem. Most emergency shelters in the County, whether they serve individuals or families, operate at or near capacity year round. During maximum times of need there are many more homeless than available emergency shelter spaces. Even with the addition of a day time drop-in center that also provides an overflow shelter, best estimates indicate the need for between 50 and 75 additional shelter spaces in the County for single men and women. At present there is shelter space for approximately forty-five families in the County while there are an estimated one hundred fifty families in need. Additional space for twelve families is provided during winter months at a local migrant camp. Even with the additional space, during February 1990, more than thirty families seeking shelter had to be turned away because of lack of space.

San Joaquin County is unable to provide general fund dollars to directly support shelter operation. Assistance is usually limited to acting as a conduit for State and Federal grant programs, technical support, and advancing funds for special projects. General fund dollars are used to provide a General Assistance program that provides housing in Single Room Occupancy (SRO) hotels for otherwise homeless individuals and as a share of the Aid to Families with Dependent Children Temporary Homeless Assistance Program for families. State funding is limited to capital projects only. It is expected that San Joaquin County will seek continuing Federal assistance to adequately provide for the needs of the homeless in the community. The County has recently begun work on a Comprehensive Housing Assistance Strategy (CHAS) that should address some aspects of the homeless issue.

The homeless are currently provided shelter primarily in Stockton, Lodi, Tracy, and Manteca, with 85 to 90 percent being in Stockton. Homeless from virtually all other County towns are referred to Stockton. Some of the major shelter providers, all of which are in Stockton, are the Stockton Shelters for the Homeless, the Gospel Center's Rescue Mission and New Hope Family Shelter, Salvation Army, Great House and Saint John's Episcopal Church (Table II.B-25). There are over twenty other shelter providers whose operations are smaller in scale. Efforts are also being made to find additional shelter space. The County has primarily directed its efforts toward providing motel rooms on an as-needed basis rather than building a large number of shelters. Those that have applied for assistance and qualified have all received it.

**TABLE II.B-25
HOMELESS, TRANSITIONAL FACILITIES and PROGRAMS**

SHELTER	FACILITY					SERVICES
	SINGLE			FAMILY		
	MEN	WOMEN	TOTAL	FAMILIES	PEOPLE	
Stockton Shelter for the Homeless	111	30	141			Shelter, drop-in, support services, case management; showers, meal. Administers State funds.
Stockton Family Shelter				20	70-80	Shelter, drop-in, support services, case management; showers, meal.
DAWN House		32	32			Battered women with/without children; support services.
Haven of Peace		35	35			Shelter for women with/ without children; meals, support services.
McHenry House				5	18	Emergency housing - families single parents, couples; meals, support services.
Salvation Army (Stockton)						Emergency food, rehabilitation, referrals, occasional family vouchers.
Salvation Army (other cities)						Emergency housing using vouchers in conjunction with local agencies.
Gospel Rescue Mission	80		80			Shelter, meals plus 30 spaces for long-term education and rehabilitation.
New Hope Family Shelter				6	24-30	Emergency shelter, meals.
New Life Mission	15		15	1-2		Emergency shelter, meals. Expansion to 30 men and 5 families.
Love Thy Neighbor						Food, clothing, referrals; occasional limited family housing in motels.
Project Hope						New shelter to open with early 1991. Five bedroom house.
St. Mary's Dining Hall						Meals, support services, showers, clothing, some job preparation, medical/dental.
Emergency Food Bank						Food for homeless and those at risk of being homeless.
San Joaquin County Mental Health Services						On-the-street outreach, crisis evaluation, emergency vouchers, crisis housing for homeless mentally ill.
San Joaquin County Substance Abuse Treatment Services						On-the-street substance abuse counseling, Detoxification services, residential treatment.
Interdenominational groups and non-profit organizations						Emergency housing assistance through vouchers, direct placements, and referrals; small food closets.
AFDC						Temporary assistance to qualified families with vouchers or cash.

General Relief: San Joaquin County provides indigents (often homeless) with support for housing through direct payments to the owners of housing space. Applications for General Relief are made in Stockton. The number of persons served through this program varies between 800 and 1100 per month, depending on time of year.

Source: San Joaquin County Comprehensive Homeless Assistance Plan, July 1990.

Many of the homeless would benefit from transitional housing programs. Estimates which have been made indicate that at least one third of the single homeless and half of all homeless families in the County would benefit from participation in such a transitional housing program. There are, however, no on-going transitional housing programs in San Joaquin County that seek to re-integrate the homeless into the mainstream of the community. The major needs regarding the establishment of transitional programs involve locating suitable properties and obtaining the funds necessary to purchase/lease appropriate buildings. With County encouragement and support, the Stockton Shelter for the Homeless has been attempting to find a site suitable for both family and single adult transitional housing. One of the Stockton Shelter locations has a very limited transitional program for single working adults that was provided without governmental funding support.

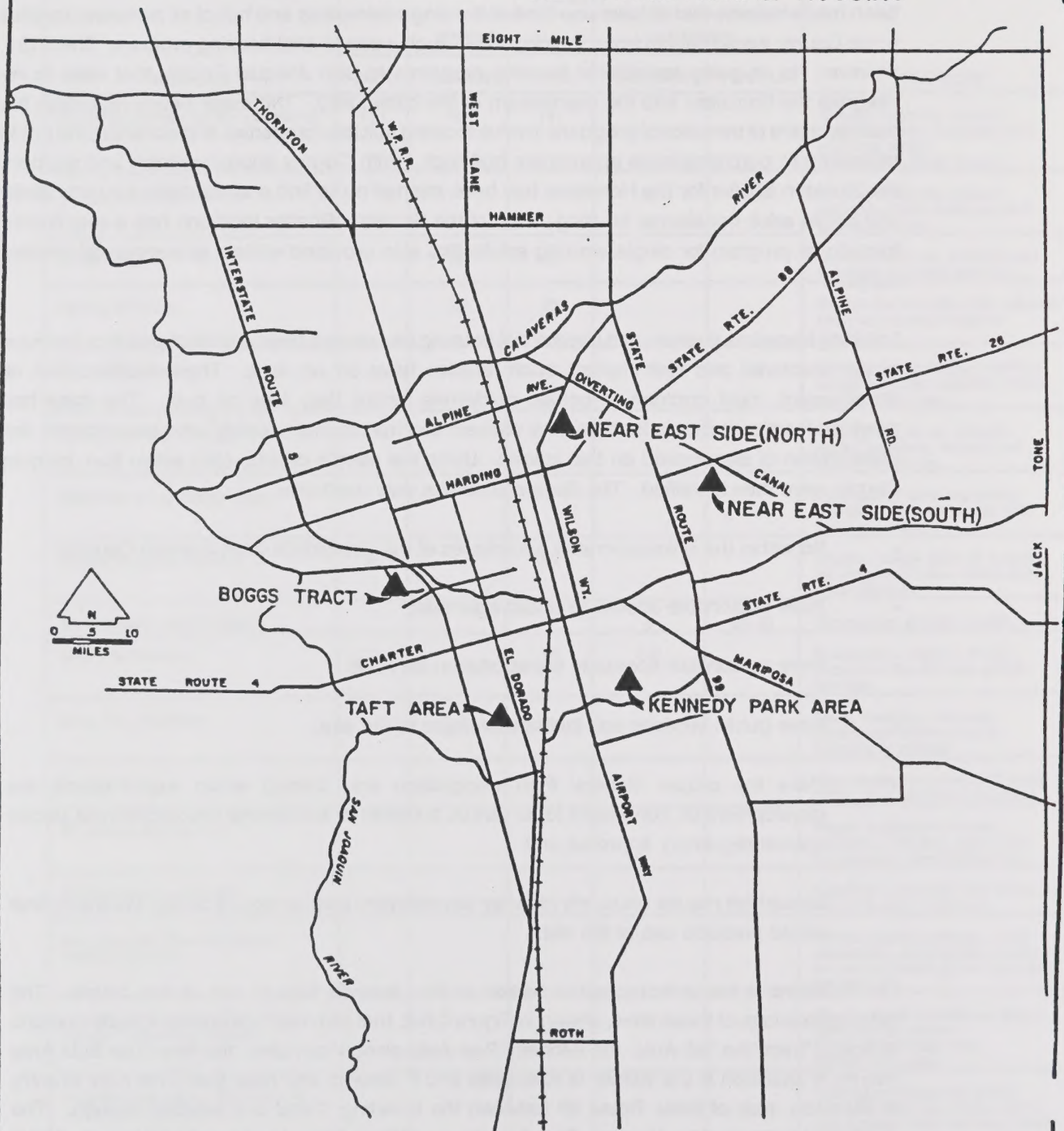
Locating homeless shelters and transitional housing has always been a difficult problem because of the perceived and real impacts such facilities have on an area. These facilities, like all development, must conform to certain guidelines before they may be built. The state has provided locational criteria for homeless shelters and transitional housing² and now requires the identification of sites based on that criteria. Using the state's criteria, sites within San Joaquin County were then identified. The State criteria that was used are:

- Be within the unincorporated boundaries of the jurisdiction (San Joaquin County);
- Have reasonable access to public agencies;
- Have reasonable access to transportation services;
- Have public services and facilities available to the site;
- Have the proper General Plan designation and Zoning which would permit the development of, conversion to, or use of, a shelter or transitional housing without undue special regulatory approval; and
- Should not require unusually high site development cost or require design standards that would preclude use of the site.

Few locations in the unincorporated portion of San Joaquin County met all this criteria. The general locations of those sites, shown in Figure II.B-2, that did meet the criteria include portions of Boggs Tract, the Taft Area, the Kennedy Park Area along Pock Lane, the Near East Side Area (North) of Stockton in the vicinity of Robindale and F Streets, and Near East Side Area (South) of Stockton, east of State Route 99 between the Diverting Canal and Mormon Slough. The residential portions of the Kennedy Park Area meets all the criteria, but the industrial section lacks urban services and facilities; the Taft Area meets all the criteria, but has portions that are in the

Figure II.B-2

LOCATIONAL SITES IN SAN JOAQUIN COUNTY
THAT MEET STATE CRITERIA
FOR HOMELESS SHELTERS AND TRANSITIONAL HOUSING



STOCKTON

MARCH 1991

Flood zone; the Near East Side Area (North) and the Near East Side Area (South) meet all the criteria although there are sections that lack storm facilities; and sections of Boggs Tract meet all the criteria with some sections only lacking storm or sanitary facilities. Additional sites may also be found near Lathrop and Manteca, but cannot be determined until the County Area Transit (CAT) finishes determining their new routes.

The fact that these locations have been identified does not necessarily mean any homeless shelters or transitional housing will be built in these locations. The purpose of this section is to provide some initial information to help guide those organizations or agencies which are trying to develop facilities and to provide information to help the Board of Supervisors in their decision making process.

Farmworkers. The number of farmworkers in San Joaquin County varies seasonally. According to the State Employment Development Department, agricultural production employment in 1989 ranged from a low of about 6,600 workers to a seasonal high of about 18,500. Of the 8,180 (average) number of hired farmworkers hired in 1989, 2,320 were regular workers and 5,860 were seasonal workers. Seasonal workers are defined as those being employed for less than 150 consecutive days by the same employer. There is a critical need for low and lower income housing units for farmworkers which will not likely decrease in the near future even though there will be a continued decline in agricultural employment in San Joaquin County.

A needs assessment of farm worker housing, which was done by the Asociacion Campesina "Lazero Cardenas" in the Stockton area, shows that many farmworker families live in overcrowded conditions, especially in the South Stockton area. Many units housing farmworkers are in poor condition. Typical family size for farmworkers is about 5.2 persons which is higher than the 1990 County average of 2.89. The market for low-income units in Stockton is tight with multiple family units having a low vacancy rate of only 2.9 percent; this market is further aggravated by the loss of single room occupancy units in the downtown area. A 1989 survey shows that over 90 percent rented with about 62 percent residing in a house, 24 percent in apartments, 7 percent in mobile homes, 15 percent in a grower's house, and 9 percent on a farm. Most lived in overcrowded conditions, averaging about 2.5 people per room and nearly 43 percent believed that their residence was inadequate.

The Rural California Housing Corporations's 1988 and 1989 Farm Labor Surveys show over 82 percent of farmworkers families with incomes below 50 percent of the 1988 median income in San Joaquin County.

In San Joaquin County there are three labor camps operated by the San Joaquin County Housing Authority. Each of these camps (two on Matthews Road in French Camp and one on Harney Lane) supply 96 units for a total of 288 units. The centers are open from May 1st through October 31st of each year and normally are occupied for the full six months by migrant workers

and their families; many other applicants never apply because of the remote likelihood of securing migrant labor housing. In addition, there is a substantial waiting list for these units. An additional 31 year-round units, also operated by the Housing Authority, has no vacancies.

An assessment of the actual number of farm labor housing units which are needed is complicated by the fact that San Joaquin County has a large resident farmworker population, many of whom own their own homes. Instead of obtaining housing with the County Housing Authority, they would either seek the accommodations provided by the farmer or their own accommodations. However, in 1989 the San Joaquin County Housing Authority had a waiting list of over 2,430 farmworker families who needed housing.

Increasingly, farmworkers are living in cities on a year-round basis, especially in existing single-family rental units in older neighborhoods such as South Stockton which is viewed as a desirable location by many farmworkers because of its supply of relatively low-cost housing and its central location in relation to farmland.

Potential Conversion of Existing Assisted Housing. Over the last thirty years numerous subsidy programs were enacted to encourage the development of multi-family housing for low- and moderate-income households and for elderly and handicapped persons. These subsidies took many forms, including mortgage and rental subsidies. Many of these are set to expire in the next twenty years by prepayment, opt out, or expiration. This could have a major impact on the already fragile affordable housing issue.

In California, approximately 117,000 rental housing units could be subject to termination of subsidies in the next twenty years. The elderly presently occupy 41% or about 48,000 of these units. In San Joaquin County, 1,759 units, 937 units of which are for the elderly, are eligible for possible termination during this time. In San Joaquin County, however, all these units are within the jurisdiction of the different cities and none are located within the County's jurisdiction.

Future Housing Needs. Future housing needs are those projected for the 1992-1997 period. The number of households in the unincorporated portion of the County is projected to increase by about 4,202 households. The number of housing units in the unincorporated area during this period is anticipated to increase by over 5,000 units.

Projected Need for New Units. Information on projected need for new housing units in the unincorporated area is provided in Table II.B-26 which is based on the County's Fair Share allocations.

To ensure that a city or County provides its "fair share" of the regional housing need, State law requires each local Council of Government (COG) to determine the market rate housing need for its areas of responsibility and to establish the number of units that each jurisdiction should provide. The San Joaquin County Council of Government has established a target of 7,716 units as the unincorporated County's fair share for the period from 1990 to 1997. The Housing Element, however, is for 1992 to 1997, and the

TABLE II.B-26: BASIC CONSTRUCTION NEEDS AND NEW HOUSEHOLDS BY JURISDICTION JANUARY 1, 1990, TO JULY 1, 1997			
	HOUSEHOLDS		HOUSING UNITS
Income Group	Number	Percent	Units
Very Low	985	23.43%	1205
Low	708	16.86%	868
Moderate	837	19.91%	1024
Above Moderate	1672	39.79%	2047
TOTAL:	4202	100.00%	5144
Source: San Joaquin County Council of Governments, Draft San Joaquin County Regional Fair Share Housing Plan, 1990-1997 (May 1991).			

allocations have been adjusted in Table II.B-26 and the following discussion to reflect this. In terms of new construction needs, 4,202 housing units will be needed in the unincorporated area between 1992 and 1997. Also during this period, another 942 housing units will be needed to maintain an adequate vacancy rate and to replace those lost through demolitions and other removals. The sum of these components of housing need is 5,144 new units.

Distribution of Projected New Housing Unit Need by Income Group. Fair Share allocations are based on household income as a percentage of the area median income. In San Joaquin County, the area median income in 1991 was \$34,000.³ Very low income households are defined as those whose income is fifty percent of the areas median income or lower, which would be up to \$17,000; lower income households are fifty to eighty percent of the area median income which is \$17,000 to \$27,200; moderate is \$27,200 to \$40,800; and above moderate is above \$40,800.

Of the approximately 5,144 new units expected to be required from 1992 to 1997 under the proposed Fair Share allocations, it is anticipated that 1,205 will be needed for very low income households, 868 for lower income households, 1,024 for moderate income households, and 2,147 for above moderate income households. This distribution is based on COG's draft Fair Share allocations as shown in Table II.B-26: Basic Construction Needs and New Households by Jurisdiction January 1, 1990 to July 1, 1997. In its previous Fair Share Plan, COG allocated 2,803 units to San Joaquin County for the 1986-1990 period; of these units, 1,048 were for very low income, 460 were for other lower income, 491 were for moderate income, and 804 were for above moderate income. Between January 1, 1986 and January 1, 1990, building permits were issued for 2,596 new housing units in San Joaquin County, consisting of 2,240 single family units, 19 duplexes, 4 multi-family, and 333 mobile homes. In 1990 and 1991, building permits were issued for 793 single-family units, 6 duplexes, 7 multi-family, and 64 mobile homes. (There are no separate figures for mobile homes in 1991 because they have been incorporated into single-family units.) The total units for 1990 and 1991 are 850 units.

Available Residential Sites. Table II.B-27 shows residential sites in the unincorporated areas for San Joaquin County that will be available for development by 1997. Parcels considered appropriate for residential development are divided into two categories: (1) vacant land that will have the public facilities and services necessary for development by 1997, and (2) land in the proposed new communities that should be available for development by 1997. The number of acres and expected number of units are given for the following General Plan Residential designations: Low Density Residential, Medium Density Residential, Medium-High Density Residential, and High Density Residential.

The availability of residential sites is determined primarily by policies contained in the General Plan and by zoning which reflects General Plan policies. One of San Joaquin County's most important policies is to locate new development in or adjacent to existing urban areas in an effort to preserve agricultural land, limit sprawl, and follow the policies of the State for growth. The County's proposed General Plan has placed its Medium-High and High Density Residential areas near exiting urban communities, which in the case of incorporated cities, follows the designation of the cities's General Plans. The County does not have the ability to provide urban services to these areas prior to annexation and urban services are seldom extended by the cities to these parcels until after they are annexed by the city and are ready for development.

For the unincorporated area as a whole, there are sites for over 36,000 possible housing units. Based on the information in Table II.B-27, it is estimated that sites for over 4,300 units for low and moderate income households could be developed during the 1992-1997 period in the unincorporated portion of the County.

In order to increase the above number of affordable units, the County has made every effort to encourage the construction of additional affordable housing units by providing several options. The County has provisions for second unit dwellings for the elderly in all residential zones in both its present Planning Title and its proposed Development Title. The County also has provisions for farm labor mobile homes within

TABLE II.B-27
Available Residential Sites (1992-1997)¹

PLANNING AREA (Unincorporated)	R/L & R/M Low Density & Medium Density		R/MH & R/H Medium High & High Density		TOTAL	
	Acres	Units	Acres	Units	Acres	Units
STOCKTON	3916	19416	85	2453	4001	² 21869
DELTA	-	-	-	-	-	-
THORNTON	281	1353	-	-	281	³ 1353
LODI	880	5082	11	137	891	5219
LOCKEFORD	245	724	-	-	245	724
LINDEN	54	227	-	-	54	227
ESCALON	144	627	-	-	144	^{3,4} 627
RIPON	123	520	-	-	123	520
LATHROP	-	-	-	-	-	-
MANTECA	-	-	-	-	-	-
TRACY	1052	5420	4	50	1056	^{3,5} 5470
TOTAL UNINCORPORATED	6695	33369	100	2640	6795	36009

FOOTNOTES:

¹ This assessment of available residential sites includes only those areas with an urban residential General Plan designation of R/L (Low Density) or greater. It, therefore, does not include approximately 1700 acres (970 units) of land carrying a General Plan designation of R/R (Rural Residential).

The amount of vacant residential land adjacent to cities that is expected to receive urban services during the 1992-1997 period is based on information provided by planners from the various cities within the County.

With regard to future residential development, the General Plans of the cities and the County are substantially in agreement. For example, where a city General Plan shows High Density Residential development on its periphery, the County General Plan also shows the same type of residential development.

² Of this total, it is estimated that over 1700 single-family units could be constructed for moderate income households. These units would sell for between \$85,000 and \$105,000, based on the selling price of comparably situated units in south and east Stockton.

³ The numbers reflect the phasing schedule provided by new community proponents.

⁴ Of this total, 245 single-family units are attributable to new community development.

⁵ Of this total, 2579 single-family units and 50 multi-family units are attributable to new community development.

agricultural areas for those farmworkers and their families that work on a farm. Pursuant to state law, the County also permits mobile homes on any residential lot in the County. A proposed inclusionary ordinance, if approved, would also contribute additional units for low income residential households.

Of further consideration is the fact that the proposed new communities were a factor in determining the fair share allocations for the unincorporated portion of the County. Although some vacant acreage for affordable units have been attributed to the new communities, the numbers and percentages do not reflect the new communities' potential shares. Prior to 1997, the new communities will be in their initial stages and will produce only a limited number of affordable units, which are reflected in Table II.B-27. As these projects develop, however, the number of affordable units that will become available will increase.

4. HOUSING CONSTRAINTS

The purpose of this section is to discuss the factors which affect the availability and affordability of housing. To evaluate these "constraints" to housing production, it is useful to examine them in terms of nongovernmental and governmental constraints.

Nongovernmental Constraints. A variety of types of cost are involved in housing production. The primary categories of housing costs are the cost of construction, the cost of land, and the availability and price of money. Each of these major components of housing costs are discussed below.

Cost of Construction. The cost of construction is primarily dependent on the cost of labor and materials. The U. S. Bureau of Labor's Producer Price Index of materials and components for construction has increased less than 3 percent per year since 1985 after a significant rise in materials costs in the mid 1970's. The cost increase in the mid 1970's primarily affected softwood lumber which is the primary material used in most types of residential construction. Other building materials which experienced a marked increase in price during this period included cement, asphalt, gypsum wallboard, composition roofing and plastic pipe. Future costs of building materials, however, are difficult to predict because of cyclical fluctuations in demand and inflation. At the present time, construction costs have decreased as a percentage of total development costs, due to increases in land and financing costs. However it is safe to assume that building materials will continue to be a major factor in cost of residential construction in the future in the San Joaquin County.

With respect to labor costs, those interviewed cited labor cost increases as among the most important factors increasing the cost of housing in the County. However, since most residential construction in the County is now done by nonunion contractors, such labor cost increases have been moderated by cyclical fluctuations in housing demand. During high housing demand period, hourly labor costs are determined by a whatever-the-market-will-bear philosophy and often approach union wage rates. During low housing demand period, labor costs are held constant and even decline.

According to the Building Division of the Department of Community Development, current residential buildings in San Joaquin County are valued at \$50.70 per square foot for living areas and \$18.00 per square foot for non-living areas such as garages.

Manufactured or factory-built housing has provided one method of reducing construction costs. A related technique is to pre-cut lumber for conventional assembly on the building site, thus saving time which translates in to dollar savings. Manufactured housing is permitted on any residential property in the County, subject to the same requirements as conventional housing.

Cost of Land. Costs associated with the acquisition of land include the market price of raw land, the cost of holding land throughout the development process, and the cost of providing services to meet County standards for development.

The cost of raw land is influenced by many variables: scarcity, location, unique features (e.g., trees, water frontage, gold course), size, availability of public utilities, zoning, General Plan designation, and the type of financing package worked out between buyer and seller. The cost of land in San Joaquin County can vary greatly, even within a specific planning area. Recent sales of raw land show large variations in prices in such places as Tracy, \$65,000 to \$160,000; Lodi, \$40,000 to \$160,000; Lockeford, \$43,000 to \$120,000; and Ripon, \$67,500 to \$160,000. Other areas have prices that do not fluctuate to such a large extent, Manteca, \$55,000 to \$80,000; Lathrop, \$40,000 to \$65,000; and Woodbridge with a little more variation of \$80,000 to \$115,000. The price range in the Stockton planning area varies primarily by the area around Stockton in which the property is located; South Stockton property sold for \$15,000 - \$20,000.

Holding costs for land awaiting development are hard to estimate being determined by the interest rate at the time of acquisition of the property and any development loans. These typically run 2 percent to 4 percent above the prime interest rate which is determined at the federal level rather than locally.

Raw land costs have now become a major consideration in residential development within urban areas in San Joaquin County, joining the cost and availability of public services, the cost of construction materials and labor, and the cost of money.

Cost of Capital. There are two kinds of capital involved in providing housing: capital used by developers for initial site preparation and construction and capital used by the home buyer. The availability and price of both types affect the cost of housing.

Capital used by developers is short-term, borrowed at commercial rates, and tend to be higher than mortgage rates. In the past, banks have been reluctant to make these "interim construction" loans to developers. After a period of easier loan requirements, the money market for real estate has again tightened. Recently, a group of local bankers have considered joint venturing in an effort to make loans more readily available for affordable housing projects, particularly multi-family, and are exploring ways of accomplishing this.

Mortgages are long term loans. As of this writing, the interest rates on single family units are around 9 percent for 15 year fixed rate mortgages, slightly higher for 30 year fixed rate mortgages, and around 7 1/2 percent for 30 year adjustable rate mortgages; these rates are all subject to change with fluctuations in the prime interest rate. Interest rates are a concern for affordable housing because the lower interest rate, the greater number of people who can normally qualify for a home loan. The state of the economy, however, and the number of people working, their incomes, and the availability of loans are also important factors in determining homeownership. The loan affordability for a single-family housing unit by interest rates and income is shown in Table II.B-28.

Governmental Constraints. Local governments affect the supply, distribution, and cost of housing by means of the General Plan, zoning, and subdivision requirements, and through building codes, development permits, and processing time and cost requirements, and infrastructure availability. This section focuses on how these factors act to affect housing production within the County.

General Plan. The purpose of the County's General Plan is to serve as a comprehensive, long-range plan for the development of an area. More precisely, it is the County's official position on development and resource management, stated as goals, policies, and implementation statements which are intended to provide the basis for consistent decision making. It is a commitment to a course of action which will lead, through the years, toward a desirable physical, social, and economic environment for existing and future generations.

The location of housing is primarily determined by the policies contained in the General Plan's Community Organization and Development Pattern section, which establishes the amount and distribution of various land uses throughout the County. The "Residential Development" policies of this section specify a range of dwelling units for each residential General Plan designation.

This authority to specify both the location and density of residential development is probably the most important power available to local government to affect the supply and type of housing developed within its jurisdiction. The location and density of residential developments are dependent upon the County's goals, objectives, and policies that are stated in the General Plan. One of the principal goals of San Joaquin County, as it is of the State of California (Government Code Section 65589.5 (c) and the State's LAFCO legislation), is the protection of agricultural lands while encouraging development within urban areas. To meet this goal, the County's General Plan has a policy of accommodating most of the County's projected growth in urban communities and an objective of minimizing the effects on agricultural land and environmental resources.

In order to provide residential areas that are both safe and sanitary, as provided in the General Plan, the County requires most residential development to have urban services, including community water, sewer, and drainage. Development, therefore, must necessarily be directed primarily to the incorporated urban communities because they have the greatest ability to provide the urban services necessary to accommodate growth by extending their existing facilities. Few of the communities outside the

**TABLE II.B-28:
LOAN AFFORDABILITY FOR A SINGLE-FAMILY HOUSING UNIT**

INTEREST RATE	ANNUAL INCOME						
	\$20,000	\$25,000	\$30,000	\$35,000	\$40,000	\$45,000	\$50,000
15%	43,500	54,350	65,200	76,100	87,000	97,850	108,700
14%	46,400	58,000	69,600	81,200	92,800	104,400	116,000
13%	49,700	62,100	74,550	87,000	99,400	111,850	124,250
12%	53,450	66,800	80,200	93,550	106,900	120,300	133,650
11%	57,750	72,150	86,600	101,050	115,500	129,900	144,350
10%	62,650	78,300	94,000	109,650	125,300	141,000	156,650
9%	68,355	85,400	102,500	119,600	136,700	153,750	170,850

Source: Westland Mortgage Service Company; Housing Element of the General Plan of the County of Sacramento.

Figures are based on principal and interest equalling 33 percent of gross income and do not include taxes and insurance. Most lenders are qualifying buyers somewhere between 30 and 40 percent of gross income, depending on how much installment debt they may have outstanding. This chart is intended only to give some idea of how large a loan a person can afford.

incorporated communities have urban services and those that do, are approaching the limits to their capacity; areas away from these communities do not have urban services available to them.

Most of the land shown by the General Plan for residential development in the unincorporated area is planned for lower density residential use, and relatively little acreage has been designated for medium and high density residential uses. This is necessary both because of policies in the General Plan and policies of the state which were discussed above and because of the land use policies and designations in the general plans of the incorporated cities for the areas within their spheres of influence. The County, in an effort to cooperate with the cities, follows land use designations of the cities and is, therefore, hampered in designating many areas for medium density and high density residential development on its own General Plan 2010 Map because the cities, where such development should occur, show little or no such development on their general plan maps for the unincorporated areas within their spheres of influence. Even if the County should designate more areas for medium and high density residential on its own General Plan 2010 Map, the situation would remain virtually the same. Generally the policy of the cities is to require an area to be annexed to the city before urban services will be provided; therefore, the services would not be available until such time as an area is annexed and once annexed would be under the jurisdiction of the city. The use of the area would then be determined by the city's general plan designation.

The whole issue of whether to meet the housing needs of County residents by increasing the amount of medium density and high density residential land on the County's General Plan 2010 Map needs to be looked at in depth. Changes to both County and city policies will be required if this option is to be considered and a consensus would have to be formulated. Consideration would also have to be given as to whether areas adjacent to cities or to unincorporated communities with municipal sewer and water systems would be able to absorb multiple family development based on their sewer and water capacities, vacancy rates, and financial situations.

An exception to the above may be the New Communities which are presently under study for possible incorporation into the General Plan. These areas are expected to have urban services available and be built with a greater range of residential units, including a higher percentage of multi-family than is presently seen in the County. It is intended that these communities remain unincorporated, and if these communities are approved for inclusion in the General Plan, they should provide an additional source of affordable housing in the County. The affordable units should consist of both single family units and multi-family units.

Zoning. By State law, zoning must be consistent with the General Plan. To the extent that zoning is consistent with the General Plan, the same questions that were raised about the extent and appropriateness of General Plan residential designations can be raised about the extent and appropriateness of single family and multiple family zones.

Apart from this concern, even when consistent with the General Plan, zoning may act as a deterrent to the construction of affordable housing. By specifying greater lot sizes than is warranted for the type of

residential development desired, there will be additional costs as result of the greater outlay for curbs, gutters, sidewalks, sewer lines, and raw land costs per lot. And these costs, borne by the developer, will be passed on to the prospective home buyer. To aid in the creation of lots for affordable housing, the County has a density bonus program by which a residential development may increase its density by providing affordable housing units.

When zoning is not consistent with residential General Plan designations, the cost for producing housing also increases because of the need to go through a Rezoning procedure which takes both time and money to do. However, more than enough land has been zoned for residential to meet the 2010 projected needs. There is a projected need for 39,200 units in the unincorporated area by 2010 and 7716 units by 1997; presently there is sufficient land zoned for 143,800 units, of which 1489 are already approved or proposed.

A review of all the zoning designations as part of the new Development Title was made in an effort to reduce all unnecessary requirements that might needlessly add to the cost of housing. Planning staff intends to attempt to keep pace with any new trends in zoning which might help to provide an increased number of affordable homes.

Infrastructure. The cost of raw land and land improvements is in part dependent on the availability of the service infrastructure. There is a limited amount of development that can reasonably occur on land serviced by wells and septic systems. To be suitable for low, medium, or high density residential development, a parcel of land must be served by an adequate public water supply, sewers, roads, etc., or there must be a way for developers and local government to provide such facilities. Even most very low density residential development requires public services as private systems are unable to work properly on parcels of less than 1 ½ to 2 acres.

In some unincorporated towns and neighborhoods, the infrastructure to accommodate additional residential growth is absent or is severely limited. General Plan policies require new residential development to occur in areas to which services and facilities have been extended. If there is no existing system, one must be provided. If a system does exist, the providers of such services, the County or unincorporated communities with sewer and water systems, must agree to extend services or there can be no project. These governmental entities, however, may lack the financial resources to provide such facilities. Consequently, unless the developer underwrites the cost of expanding sewer, water, and drainage facilities, proposed residential developments will not be able to occur. In order for this to be profitable, the developer would have to be able to build a large number of units.

If the County wishes to provide financial assistance to these communities, there must be a careful evaluation of where such investment would produce the greatest benefit to low and moderate income families. This is especially important since the ability of local government to raise money for public purposes has been substantially reduced because of the passage of Proposition 13 in 1978 and because of the reduction (and proposed reduction) in Federal grants for local capital improvements.

Building Codes. The basic purpose of the Building Code is to protect the public from unsafe buildings and unsafe conditions associated with construction. Constantly changing materials and construction techniques, however, make it necessary to continually review and update the Building Code to avoid obsolescence and to ensure that health and safety standards are maintained. Such code maintenance also provides an opportunity to ensure that the code does not unnecessarily require costly materials or construction techniques.

By State law, all counties are required to adopt the latest State Building Code. The State, however, is often slow to adopt the changes made in the Model Building Code and incorporate them into the State Building Code, changes which often reflect the latest construction techniques and new materials which can help to reduce the cost of producing. In an effort to address this problem, the County provides for the use of methods of construction or materials not specifically prescribed in the code if they conform to the Building Codes provision for such materials and methods and are approved and authorized by the County's Building Official.

San Joaquin County is presently using the 1988 Uniform Building Code which was adopted by the State. The 1991 Uniform Building Code will be used as soon as it is adopted by the State and the Board of Supervisors.

Each county may add additional requirements to the Code, some of which may add to the cost of housing. San Joaquin County, however, has added few additional requirements to the State's requirements, and these have only been added because they are needed for safety reasons caused by conditions unique to San Joaquin County.

Development Permit Fees. Since the passage of Proposition 13 in 1978, revenues received from property taxes by local government have been reduced. In San Joaquin County, this has contributed to a reassessment of development fees charged to the public. The basic goal of this reappraisal was to bring fees in line with actual processing costs to help recover the cost of services. This has caused a shift of a major portion of the cost of providing services from the County to the actual recipients of those services. However, in the case of housing, the builder or developer usually passes these increased costs to the home buyer or tenant, thus raising the price of new housing.

A developer who might desire to build a 100 unit single family subdivision in an area which meets both zoning and General Plan requirements and which will be provided with the necessary urban services (e.g., sewer and water) will be faced with paying a number of planning fees. In 1991 he would pay an application fee for a Major Subdivision of \$3940 plus \$8 per lot for a total of \$4,020. An environmental assessment would have to be made and if an Environmental Impact Report is needed, he could anticipate paying \$40,000 - \$60,000. If his subdivision is approved, he is subject to a number of additional charges such as map checking by the County Surveyor's Office, plan checking and field checking by the Public Works Department, and building permits and inspections by the Building Inspection Division. These charges are based on current fee schedules which are available at the Community Development Department.

These costs reflect the actual processing costs. It became necessary to charge these fees after the passage of Proposition 13 which greatly restricted the government's abilities to raise funds necessary for processing applications and inspections needed for the protection of the County's citizens. After a recent careful reevaluation of the County's development fee structure, fees increased approximately 25 percent, less than the such neighboring jurisdiction of Sacramento County which recently raised their fees by about 46 percent. San Joaquin County's fees are in line with the fees of the surrounding county's that also try to charge fees that reflect the actual costs incurred in serving public.

Finally, there are a number of other fees required by the state and other districts. The state, in addition to its requirement for environmental review, also requires other fees such as the fee paid to Fish and Game, \$1,250 for a project approved pursuant to a negative declaration and \$850 for a project approved pursuant to an EIR. Fees for other districts include traffic impact fees which average about \$2,252, fire district fees of approximately \$0.17 per square foot, school district fees which average \$1.56 per square foot, and the newly enacted water supply facilities impact mitigation fees of \$1,000. These fees have also become necessary because of a lack of sufficient funds to provide needed services or to correct unsafe or unsatisfactory conditions.

In a continuing effort to provide better service to the public, the County has recently implemented proceedings by which staff will be able to inform project applicants, at the earliest possible stage in the application process, of the permit fees and costs which will be required in order for them to implement their project. This will enable applicants to better manage their projects by including these costs in their budgets and fiscal programs early in the process.

Permit Processing Time. Permit processing time can affect the cost of housing by increasing the amount of interest paid while holding the land. Under current procedures, the time required to process a Major Subdivision application is approximately two months after the tentative map has been approved. This is well within the one year time limit required by Section 65943 of the Government Code. For Minor Subdivision applications (i.e., subdivisions normally of four parcels or less), the time is much less: six weeks on the average. For Major Subdivision applications which require an Environmental Impact Report, the time needed to process the application is longer (nine months on average), but is usually within the one year time limit.

If the proposed residential development is a major subdivision, the developer can expect to attend a number of conferences and public hearings. A preapplication conference is required to identify issues and problems. A meeting before the Development Committee, which is composed of representatives from the Public Works Department, Planning Division, the Public Health Services, the Building Division and other agencies which have expressed interest in the project, is held to identify conditions of approval. A public hearing before the Planning Commission must be held. The public hearing before the Planning Commission normally is the last meeting which the developer needs to attend unless the action of the Planning Commission on his application is appealed to the Board of Supervisors. If a rezoning is necessary, two additional hearings are required before the Major Subdivision application can be submitted: one before the Planning Commission and one before the Board of Supervisors.

After the application has been approved by the review authority, an additional 45 days to 60 days is required for final map and subdivision improvement plan approval. This assumes that the developer has complied with the requirements of the Public Works Department for submitting plans and that all conditions of the Tentative Subdivision Map have been complied with. If there are problems at this stage, the approval process could be increased by several weeks or even months.

It should be noted that the County has taken a number of steps to reduce permit processing time. It has standardized and simplified procedures for reviewing development applications and simplified the application forms; it has revised the Subdivision and Zoning Ordinances to eliminate cumbersome and outmoded requirements; it has initiated the development and implementation of an automated tracking system for all applications and permits; and it has standardized improvement requirements (e.g. landscaping, drainage, street improvements) in an effort to reduce confusion and assist applicants in their design efforts. Recently the Department of Community Development has reorganized to bring together staff from Planning, Building, Public Works, and Environmental Health under the Development Services Division in an effort to shorten processing time and improve service. Every effort has been made to make the process as expeditious and easy as possible for the applicant. Improvement of the process will continue to be a primary aim of this Department.

On-Site and Off-Site Improvements. The installation of certain on-site and off-site improvements to provide for the health, safety, and livability of residential neighborhoods is required by the County as a condition of subdivision map approval. A number of these are standard requirements, such as the installation of streets, sidewalks, curbs, and gutters, storm sewer facilities, and sanitary sewer facilities. Others, such as the expansion of sewage treatment facilities, the provision of terminal drainage facilities, and the upgrading of existing water systems, are unique to specific developments. These facilities are then dedicated to the County, or to a special district, which is responsible for their maintenance.

These improvement costs are initially paid for by the developer, but are eventually passed along to the consumer in the purchase price of the home or in the contract rent of the dwelling. Because these costs vary greatly from development to development (depending on the necessity to cover such unique costs as the cost of bridges, pump stations, trunk lines, etc.), the average improvement cost per lot only represents the middle ground between a wide range of actual improvement costs; the figure itself does not necessarily reflect the actual improvement costs experienced by any specific development. With that in mind, in 1990 the average improvement cost (i.e., site development cost) per lot for a residential subdivision in the unincorporated area, for which the full range of urban services was required, was \$10,000. Because of the added cost for such improvements as streets in rural areas, the average cost in a rural area was \$15,000.

5. ENERGY CONSERVATION

State law requires every city or county preparing a Housing Element to conduct an analysis of opportunities for energy conservation with respect to residential development within its jurisdiction. In accordance with this requirement, the following analysis of the County's involvement in furthering opportunities for energy conservation is provided. This analysis is conducted at four levels: 1) the County's efforts at implementing the residential energy standards for new housing units required by Title 24 of the State Building Code; 2) the County's involvement in assuring that subdivisions are designed so that they provide, to the extent feasible, for future passive or natural heating or cooling opportunities; 3) the County's involvement in assisting homeowners in weatherizing their homes; and 4) other efforts by the County at promoting and encouraging energy conservation.

New Residential Energy Standards. Title 24 of the State Building Code requires new residential buildings to meet a comprehensive set of standards for energy conservation. Builders of these units may achieve compliance either by calculating energy performance in a prescribed manner or by selecting from alternative component packages which prescribe a fixed method of compliance.

All proposed residential units are checked by the County Building Division to insure that their design and construction complies with the Title 24 energy standards. Additions and alterations must also meet the Title 24 energy standards if they increase the heated or cooled floor space of a building.

Implementation of the Title 24 energy standards has, however, created problems. The calculations to determine energy performance are complex, often involving numerous substitutions, adjustments or credits for construction variations to achieve compliance with energy standards. While the California Energy Commission estimates that initial cost of compliance to the homeowner will be more than offset by the long-term savings in energy costs, the initial compliance cost, passed on to the home buyer by the builder, may be sufficient by itself to exclude even more County residents from new homeownership. The County Building Division has estimated that the cost of meeting the Title 24 energy standards for a typical home is, on the average, \$2,000. In this regard, the Title 24 energy standards themselves could be viewed as a constraint to housing affordability. Also, while long-term savings to the homeowner may be realized, it is not clear if renters will reap similar benefits since any savings in energy costs could be offset by rents that are higher in order to cover the initial cost of the required conservation measures.

Finally, with respect to problems resulting from implementing the Title 24 energy standards, the County Building Division states that the new energy standards have put an undue burden on the Division, building contractors, and the general public. The Deputy Director of Building Inspection notes that all members of his staff have spent a disproportionate amount of their time working with the new energy standards as compared to other areas of building code enforcement, that the standards are subject to revisions which necessitate constant monitoring and changes in procedures for calculating energy compliance, that a significant amount of time is spent explaining these standards to the general public, and that enforcement of the standards in the field becomes an almost impossible task.

To achieve the goal of providing energy conservation for new residential units, the Building Division advocates using one set of standards with no requirements for calculations. Use of this approach would simplify the administration of the standards, reduce implementation costs to the County, and make energy requirements more cost effective.

Subdivision Design Relative to Providing Heating or Cooling Opportunities. Section 66473.1 of the State Subdivision Map Act requires that the "design of a subdivision for which a tentative map is required shall provide, to the extent feasible, for future passive or natural heating or cooling opportunities in the subdivision." Although this section does not contain any precise standards, the State Attorney General has opined that "a tentative map of a subdivision must be disproved if it fails to meet the design requirement of Government Code Section 66473.1."

In its review of major subdivisions, the County encourages lot patterns which seek to maximize natural heating and cooling opportunities. Lot orientations which diminish or enhance natural heating and cooling opportunities are pointed out. However, no formal mechanism exists which would require a builder/developer to make specific changes in his subdivision design to meet the requirements of Section 66473.1 of the State Subdivision Map Act. The fact that the County's terrain is naturally accommodating to future passive or natural heating or cooling opportunities means that simple street orientation is sufficient to maximize them. It also means that special design accommodations for subdivisions in the County are not required in order to effectively provide for future passive or natural heating or cooling opportunities.

Weatherization Activities. The County is involved in several programs for making existing residences more energy efficient. The County, through its housing rehabilitation program, provides for the weatherization of dwellings if an owner does not qualify for grant or loan assistance offered by other agencies with weatherization programs. The County also refers elderly homeowners and low income householders within certain income limits, and the general public, to agencies offering weatherization programs. Such referral augments or leverages the funds which the County has available for its housing rehabilitation program. A description of the weatherization programs offered by these agencies is provided below.

Direct Weatherization Program. For elderly households and low income households, PG&E (Pacific Gas & Electric Company) offers a direct weatherization program which provides a number of conservation measures at no cost to the homeowner. Six conservation measures must be carried out in order to qualify for the program. These measures, which are the same as those required by PG&E's Zero Interest Program (see below), consist of ceiling insulation, door weatherization, waterheater blankets, low flow showerheads, caulking, and duct wrapping. Some types of home repair are also allowed under this program if directly related to weatherization (e.g., replacement of broken glass and rotted sashes; door, lock and threshold replacement if needed). PG&E contracts with the Valley Resource Center, a nonprofit agency, to implement the program in San Joaquin County. The Valley Resource Center qualifies the applicant on the basis of income and subcontracts with Cal Valley Insulation to do the actual work. The income limits for the program are based on 50 percent or less of median income for low-income

households, 50 to 80 percent of median income for low, low-income households, and 80 to 120 percent of median income for medium-income households adjusted on the basis of family size.

Zero Interest Program. PG&E's Zero Interest Program (ZIP) provides interest-free loans to qualified homeowners for special home weatherization measures. Once a homeowner is qualified to participate in the program, an assessment of the extent and cost of the work is made by a contractor who is approved by PG&E to do the actual work. At the conclusion of the project, PG&E conducts an inspection to make sure that the work was done properly. Pacific Conservation Services provides the interest-free loan to the homeowner for PG&E. The loan is repaid to PG&E in 100 equal payments, if the homeowner's income is within the income limits for low income or elderly households established for PG&E's Direct Weatherization Program. If the homeowner's income exceeds the Direct Weatherization Program income limits, the loan is repaid in 50 equal installments.

Housing and Human Services Weatherization Program. The U.S. Department of Housing and Human Services provides grants to homeowners for home weatherization. The California Department of Economic Opportunity administers the Federal program, contracting with the Valley Resource Center to implement the program in San Joaquin County. As with PG&E's Direct Weatherization Program, the Valley Resource Center qualifies the applicant on the basis of income and subcontracts with Cal Valley Insulation to do the actual work. Those households eligible to participate in the program must have incomes which do not exceed 130 percent of poverty level. Conservation measures which qualify for funding are the same as those specified in PG&E's Direct Weatherization Program. However, not all six conservation measures mandated by PG&E's Direct Weatherization Program need to be undertaken to qualify for the program. Thus, if a home needs only ceiling insulation or just caulking and duct wrapping, only these activities need to be undertaken.

Department of Energy Weatherization Program. The U.S. Department of Energy provides weatherization grants to homeowners similar to those offered by the U.S. Department of Housing and Human Services. The only difference between the two programs is the slight variation in income qualifying limits. The California Department of Economic Opportunity administers the program, Valley Resource Center implements the program in San Joaquin County for the State, and Cal Valley Insulation performs the work as a subcontractor for the Valley Resource Center.

Other County Efforts to Promote Energy Conservation. The County has a number of General Plan policies and ordinance requirements which fosters energy conservation opportunities (see particularly, the "Energy" section in the Resources chapter of the General Plan). These policies and ordinance requirements necessitate that urban growth take place within and adjacent to urban centers and be provided with basic services. Their implementation serves to encourage a development pattern which results in increased energy conservation.

6. HOUSING ELEMENT REVIEW: PROGRESS REPORT



By State law (Government Code Section 65588), each city and county is required to review its Housing Element to evaluate: "1) the appropriateness of the housing goals, objectives and policies in contributing to the attainment of the State Housing Goal; 2) the effectiveness of the Housing Element in attainment of the community housing goals and objectives; and 3) the progress of the city or county in implementation of the Housing Element."

With respect to the first objective, the County has reassessed its housing goals, objectives and policies. While the goals, objectives and policies contained in the 1987 Housing Element were considered adequate in contributing to the State Housing Goal of "the early attainment of decent housing; and a suitable living environment for every California family," it was concluded by staff that changes were also needed in order to provide a more direct linkage between General Plan housing goals, policies, and objectives and the actual implementation program. In the General Plan revision process a number of goals, objectives, and policies were rewritten to fit the new format, along with the elimination of ambiguous, repetitious, and conflicting objectives.

Review of the second objective - the effectiveness of the Housing Element in attaining the community's housing and objectives - shows that given budgetary, staffing, and other limitations, the county has made noteworthy progress toward the achievement of housing goals and objectives. In addition, there were also other programs undertaken by the County, but not listed in the implementation schedule, which were supportive of, or complementary to, specific housing programs noted in the previous Housing Element.

Finally, regarding an evaluation of progress made in the implementation of the Housing Element in terms of specific projects, the following progress report is provided. This report is keyed to Table II.B-29 which lists the housing activities identified in the 1992 Housing Element. This Table identifies each activity by Roman numeral in the comment column and then provides a brief comment on the status of each.

**TABLE II.B-29:
Progress Report for Housing Program: 1986 - 1191**

Program Project	Responsible Agency	Funding Source	Units Affected	Reference Number	Status
PRESERVING HOUSING & NEIGHBORHOODS					
Lathrop Housing Rehabilitation Program	S.J. County	State Small Cities CDBG	30	(I)	Terminated
Countywide Housing Rehabilitation Loan Program	S.J. County	HUD CDBG	75	(II)	Ongoing
Limited Housing Rehabilitation Program	S.J. County	HUD CDBG	280	(III)	Expanded
Lathrop Sanitary Sewer Connection Program	S.J. County	State Small Cities CDBG	260	(IV)	Terminated
Lathrop Sanitary Sewer Project	S.J. County Lathrop Water District	State Small Cities CDBG FmHA, EPA, Local	260	(V)	Completed
Larch Clover Water System	S.J. County	HUD CDBG	165	(VI)	Completed
Thornton Terminal Drainage Project	S.J. County	HUD CDBG	200	(VII)	Continuing
Woodbridge Terminal Drainage & Water System Project	S.J. County	HUD CDBG	600	(VIII)	Continuing
Acampo Water system	S.J. County	HUD CDBG	59	(IX)	Completed
French Camp Water System	S.J. County	HUD CDBG	Not Available	(X)	Continuing
East Stockton Sanitary Sewer Project	S.J. County	EPA Grant, State Clean Water Grant	5,000	(XI)	Completed
Analysis of the Use of Federal & State Rehab Loan Programs	S.J. County	Local	Not Available	(XII)	Ongoing
Technical Assistance to Organizations involved in Private Rehabilitation	S.J. County	Local	Not Available	(XIII)	Ongoing
PRESERVING HOUSING AFFORDABILITY					
Bonus Incentive Ordinance	S.J. County	Local	Not Available	(XIV)	Public Hearing
Regulatory Incentive Ordinance	S.J. County	Local	Not Available	(XV)	Expanded
Planned Residential District	S.J. County	Local	Not Available	(XVI)	Public Hearing
Revision of Development Policies, Standards & Requirements	S.J. County	Local	Not Available	(XVII)	Ongoing
Adoption of the Latest Model Codes	S.J. County	Local	Not Applicable	(XVIII)	Ongoing
Automated Permit Tracking System	S.J. County	Local	Not Applicable	(XIX)	Ongoing
Study of Residential Development Policies	S.J. County	Local	Not Applicable	(XX)	Expanded & Completed

TABLE II.B-29 (Cont.)
Progress Report for Housing Program: 1986 - 1991

Program Project	Responsible Agency	Funding Source	Units Affected	Reference Number	Status
Social & Economic Counseling in Conjunction with Housing Rehabilitation	S.J. County	HUD CDBG	Not Applicable	(XXI)	Ongoing
Weatherization Activities	S.J. Co., PG&E, Valley Resources Center-Cal Valley Insulation	HUD CDBG; Private Monies	Not Available	(XXII)	Ongoing
Revisions to State Energy Standards	S.J. County	Local	Not Applicable	(XXIII)	Ongoing
Technical Assistance to FmHA Section 502 Program Applicants/Recipients	S.J. County	Local	Not Available	(XXIV)	Ongoing
Technical Assistance to Developers Providing Housing for Low & Moderate Income Persons	S.J. County	Local	Not Available	(XXV)	Ongoing
ASSURING ADEQUATE SITES FOR HOUSING					
Processing of Permits for New Dwelling Units	S.J. County	Local	3500	(XXVI)	Ongoing
Study of Medium Density & High Density Land Needs	S.J. County	Local	Not Available	(XXVII)	Public Hearing
Residential Rezoning Program	S.J. County	Local	Not Available	(XXVIII)	Ongoing
Application of General Plan Goals & Policies & Actions to Housing Sites	S.J. County	Local	Not Available	(XXIX)	Ongoing
PROVIDING HOUSING DIVERSITY					
Section 8 (Existing Housing) Program	Housing Authority	HUD	200	(XXX)	Ongoing
Processing of Mobilehome Applications for Farm Laborers	S.J. County	Local	200	(XXXI)	Ongoing
Processing of Mobilehome Applications for the Elderly	S.J. County	Local	220	(XXXII)	Revised
Revision to Second Unit Dwelling Ordinance	S.J. County	Local	Not Available	(XXXIII)	Expanded Ongoing
Ordinance Revisions Relative to Social Care Facilities & Family Day Care Homes	S.J. County	Local	Not Available	(XXXIV)	Public Hearing
Shelter for Homeless	City of Stockton S.J. County	Local	100 Persons	(XXXV)	Completed
ELIMINATING HOUSING DISCRIMINATION					
Anti-Housing Discrimination Efforts	S.J. County SCHR	Local	Not Available	(XXXVI)	Ongoing
Fair Housing Study & Policy Review	S.J. County	Local	Not Applicable	(XXXVII)	Delayed

TABLE II.B-29 (Cont.)
Progress Report for Housing Program: 1986 - 1991

REFERENCE
NUMBER PROGRAM/PROJECT

PRESERVING HOUSING AND NEIGHBORHOODS

- (I) Lathrop Housing Rehabilitation Program. Thirty homes were rehabilitated. The community of Lathrop incorporated on July 1989, and became the County's seventh city. This program was terminated.
- (II) County-wide Housing Rehabilitation Loan Program. This is an ongoing activity. Under this program 354 homes were rehabilitated between January 1, 1986 and December 31, 1990.
- (III) Limited Housing Rehabilitation Program. This program no longer exists; it has been expanded into a county-wide sanitary and water connection program.
- (IV) Lathrop Sanitary Sewer Connection Program. Forty CDBG funded sewer connections were made before this program was terminated with the incorporation of the City of Lathrop.
- (V) Lathrop Sanitary Sewer Project. Sanitary sewer lines were installed. Three hundred and sixty-nine (369) parcels were served. This project has been completed.
- (VI) Larch Clover Water System. This project was completed in 1988. The water system was installed serving one hundred and sixty-five (165) units. The project has been completed and the system is operated and maintained by the City of Tracy.
- (VII) Thomton Terminal Drainage Project. Phase I construction (Stockton Street to Mokelumne River) is now underway and will be completed in early 1991. Phase II design is almost complete.
- (VIII) Woodbridge Terminal Drainage and Water System Project. This project's Phase I (central truck line) was completed in 1989. Phase II design is almost complete and Phase II construction is scheduled for 1991. Phase III, (Water System Deficiencies) has been identified and preliminary design work has been completed. Construction of Phase III is unscheduled and is awaiting a funding source.
- (IX) Acampo Water System. This project has been completed. The projects completion upgraded the system in place for fifty-nine (59) homes. Both new wells have been completed and are operational. The water supply is now in compliance with both primary and seconding drinking water standards. Improvements to the distribution system have been made to insure an adequate water supply for residential use and fire protection.
- (X) French Camp Water System. Phase I, the French Camp Water Study is scheduled to be completed in 1991. This study should determine the most economical means of establishing

TABLE II.B-29 (Cont.)
Progress Report for Housing Program: 1986 - 1991

a public water supply system in the community of French Camp. The design and construction phases are unscheduled.

- (XI) East Stockton Sanitary Sewer Project. This project has been completed. The East Stockton Sanitary Sewer system was completed in 1987. Approximately five thousand (5,000) housing units are now receiving benefits from this project. The small amount of excess capacity existing at the end of the project has been used to develop new, moderate income housing in the area.
- (XII) Analysis of Federal and State Rehabilitation Loan Program. This is an ongoing activity. (See Volume I, Table IV-3 (i) for discussion)
- (XIII) Technical Assistance to Organizations Involved in Private rehabilitation. This is an ongoing activity. (See Volume I, Table IV-3 (j) for discussion)

PRESERVING HOUSING AFFORDABILITY

- (XIV) Bonus Incentive Ordinance. Implementation of this ordinance was delayed because of the County's General Plan revision process. As part of the County's Comprehensive Planning Program and the revision of the County's General Plan and development regulations, density bonuses and incentives are included in the proposed Development Title pursuant to Section 65915 of the California Government Code.
- (XV) Regulatory Incentive Ordinance. As an alternative to this proposed ordinance, the County has elected to include the provision of Government Code 65915 in the County's proposed Development Title.
- (XVI) Planned Residential District. Implementation of this ordinance was delayed because of the County's General Plan revision process. A Planned Residential District, or Planned District, chapter has been included in the proposed Development Title.
- (XVII) Revision of Development Policies Standards, and Requirements. Revision of the County's development regulations and improvement standards is an ongoing process. The new Development Title is in the process of being adopted as part of the General Plan revision process. The new Public Works Improvement Standard is in the process of being adopted and should be approved in 1991; this provides standards for all infrastructure to insure that adequate water supply, sewerage, drainage, and roadways exist to support development.
- (XVIII) Adoption of Latest Model Codes. This item is an ongoing process. The State Building Standards Commission has improved the time period by which the State adopts, by reference, the model codes with any amendments made by the State. There are still numerous amendments by state agencies which causes confusion and delay. The local jurisdiction cannot adopt the most recent edition of the model codes until it has been adopted by the State Building Standards Commission. The County Building Official is a member of CALBO (California

TABLE II.B-29 (Cont.)
Progress Report for Housing Program: 1986 - 1991

Building Officials). This organization has taken the lead in working with the State Building Standards Commission to improve the entire Adoption process.

- (XIX) Automated Permit Tracking System. This is an ongoing activity of development, enhancements and improvement. In September of 1990, an initial, limited capability building permit issuance system became operational. Virtually all building permits are now issued through this system.
- (XX) Study of Residential Development Process. This project was part of the process that lead to the establishment of the County's Development Services Division. This division function is the processing of "One Stop Shopping" development permit applications.
- (XXI) Social and Economic Counseling in Conjunction with Housing Rehabilitation. This is an ongoing activity. (See discussion of this activity elsewhere in this Document)
- (XXII) Weatherization Activities. This is an ongoing activity. (See Volume I, Table IV-3 (l) for discussion)
- (XXIII) Revisions to State Energy Standards. This has been an ongoing project. The County will continue to work with the State Energy Commission to modify the Title 24 Residential Energy Standards in order to simplify the administration and enforcement of such standards, to reduce implementation costs, and to make such requirements more cost effective.
- (XXIV) Technical Assistance to FmHA Section 502 Program Applications and Recipients. This is an ongoing activity. (See Volume I, Table IV-3 (s) for discussion)
- (XXV) Technical Assistance to Developers Providing Housing For Low and Moderate Income Persons. This is an ongoing activity. (See Volume I, Table IV-3 (t) for discussion)

ASSURING ADEQUATE SITES FOR HOUSING

- (XXVI) Processing of Permits for New Dwellings Units. This is an ongoing activity. The County estimated that it would process 3500 new residential unit permits between 1985 and 1991, (a seven year period). From January 1, 1986, to December, 31, 1990, the County processed 3005 new residential building permits, (a five year period).
- (XXVII) Study of Medium Density and High Density Residential Land Needs. This project was part of the County's Comprehensive Planning Program and its conclusion will be implemented by the adoption of the County's General Plan and Development Title.
- (XXVIII) Residential Rezoning Program. This continues to be an ongoing activity which is tied to the availability of urban services.
- (XXIX) Application of HAP and General Plan Goals, Policies and Actions to Housing Sites. This is an ongoing activity. (See Volume I, Table IV-3 (bb) for discussion)

TABLE II.B-29 (Cont.)
Progress Report for Housing Program: 1986 - 1991

PROVIDING HOUSING DIVERSITY

- (XXX) Section 8 (Existing Housing) Program. This is an ongoing activity. This existing program is administered by the San Joaquin County Housing Authority. The Housing Authority has over 2600 active cases. Since January 1986, the Housing Authority served approximately 340 new families. During the last year, five percent of cases were within the unincorporated area of the County. The 95/5 split is in keeping with the average yearly rate of incorporated / unincorporated case load of the Housing Authority.
- (XXXI) Processing of Mobilehome Applications for Farm Laborers. This is an ongoing activity. The County estimated that it would process 200 new farm labor mobilehome applications permits between 1985 and 1991 (a seven year period). From January 1, 1986, to December, 31, 1990, the County processed 333 new farm labor mobilehome application permits (a five year period).
- (XXXII) Processing of Mobilehome Applications for the Elderly. The County estimated that it would process 220 new "accessory" mobilehome applications permits between 1985 and 1991, (a seven year period). From January 1, 1986, to December, 31, 1989, the County processed 218 new "accessory" mobilehome application permits, (a four year period). During 1990 these applications were discontinued and the Second Unit Dwelling provisions were expanded to include mobile homes for the elderly.
- (XXXIII) Revisions to Second Unit Dwelling Ordinance. The revisions to the Second Unit Dwelling Ordinance have been implemented and have been successful in promoting additional housing for the elderly. From fewer than a dozen dwellings permits in the early 1980's, permits have increased to 155 in the last two years.
- (XXXIV) Ordinance Revision Relative to Social Care Facilities and Family Day Care Homes. Implementation of this ordinance was delayed because of the County's General Plan revision process. As part of the County's Comprehensive Planning Program and the revision of the County's General Plan and development regulations, the social care facilities requirements have been clarified.
- (XXXV) Shelter for the Homeless. This project has been completed. Services include shelter, drop-in, support services, case management, showers, meals and administration of State funds. The single person shelter began operational December 1987, (111 men, 30 women). The family portion of the shelter began operation in 1988 for with room for 20 families.

ELIMINATING HOUSING DISCRIMINATION

- (XXXVI) Anti-housing Discrimination Efforts. This continues to be an ongoing effort and activity.
- (XXXVII) Fair Housing Study and Policy Review. This program was deferred to the upcoming five year schedule of activities for the housing program.

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C. TRANSPORTATION

1. INTRODUCTION

The circulation system of San Joaquin encompasses the full range of transportation facilities. Three transcontinental railroads, two intercity bus lines, five public transit operators, many specialized transportation systems, over 100 regularly scheduled contract truck lines, a major deep water port, a metropolitan airport, and other public access airports provide transportation services to San Joaquin County. With practically all modes of transportation available and a road network which includes two of California's major north-south routes, Interstate 5 and State Route 99, this area is a major transportation center.

However, several deficiencies currently exist in the transportation system, and major improvements are needed to accommodate growth. Without these, economic growth in the County will be inhibited. These problems concern the capacities of street and highway facilities, retention of essential air passenger service to Stockton Metropolitan Airport, and improvements in access to the port facilities in order to handle the rapid growth occurring at the port. Some of the major State highways through portions of the County are already at capacity. Growth in the next 20 years is projected to overload many more, as well as local streets. This Chapter describes the County's existing transportation services, highlights some of these deficiencies, and describes needed improvements.

The San Joaquin County Council of Governments (COG) is responsible for preparing a Regional Transportation Plan and updating the plan every two years. The Plan addresses each of the modes of travel used in the County to carry people and goods. Because the COG's process for preparing the Plan is similar to the County's process for developing the General Plan (i.e., it is continuous, comprehensive, and coordinated), many of the findings, policies, and actions contained in the COG's 1988 Regional Transportation Plan are appropriately echoed in the County's General Plan. Likewise, much of the text presented here is adapted from the COG's 1988 Update of the Regional Transportation Plan.

2. ROADWAYS

Key Concepts. It is useful to have an understanding of some key concepts that are frequently used to describe roadways and their travel characteristics.

Functional Classification. Roads can be classified and defined a number of different ways, but the most commonly used approach is to characterize them by their function, that is, how they are used.

- o Freeways - Operated and maintained by the Department of Transportation (Caltrans), these facilities are designed as high-volume, high-speed facilities for intercity and regional traffic. Access to these facilities is limited.
- o Expressways - These facilities are high-speed roadways for inter community travel. They generally have 4-6 lanes, and access and intersections are usually controlled. Expressways typically carry traffic between important centers of activity or employment.

- o Arterials - These facilities, including Major and Minor Arterials, are the principal network for through-traffic within a community and often between communities. Carrying 25,000-45,000 trips per day, arterials provide access routes to shopping areas, places of employment, recreational areas, and other places of assembly. Minor arterials include four lanes; major arterials, 4-6.
- o Collectors - Two-lane facilities, Collectors function as the main interior streets within neighborhoods and business areas. They are designed to carry under 10,000 vehicles per day and serve to connect these areas with the higher classification roadways.
- o Local - These facilities are two-lane streets that provide local access and service. They include residential, commercial, industrial, and rural roads.

Levels of Service. To evaluate the operational characteristics of a roadway, a simple grading system is used that compares the traffic volume carried by a road with the capacity of that road. The ratio of the volume to the capacity (volume/capacity) is an indicator of traffic conditions, speeds, and driver maneuverability.

- o Level of Service A - conditions of free flow; speed is controlled by driver's desires, speed limits, or physical roadway conditions. Volume/capacity ratio = 0 to 0.34.
- o Level of Service B - conditions of stable flow; operating speeds beginning to be restricted; little or no restrictions on maneuverability from other vehicles. Volume/capacity ratio = 0.35 to 0.50.
- o Level of Service C - conditions of stable flow; speeds and maneuverability more closely restricted; occasional backups behind left turning vehicles at intersections. Volume/capacity ratio = 0.51 to 0.74.
- o Level of Service D - conditions approach unstable flow; tolerable speeds can be maintained but temporary restrictions may cause extensive delays; little freedom to maneuver; comfort and convenience low; at intersection, some motorists, especially those making left turns, may wait through one or more signal changes. Volume/capacity ratio = 0.75 to 0.89.
- o Level of Service E - conditions approach capacity; unstable flow with stoppages of momentary duration; maneuverability severely limited. Volume/capacity ratio = 0.90 to 0.99.
- o Level of Service F - forced flow conditions; stoppages for long periods; low operating speeds. Volume/capacity ratio = 1.00 or greater.

Because the heaviest travel occurs during the peak periods, when people are going to and coming from work, the volume/capacity ratio is often reported for these periods at critical intersections. However, where the data is not available for intersections or for peak periods, average daily traffic figures are used for a road segment and standards defined by the Transportation Research Board or the State are used for the capacity.

Integrated Road System. The road system must be carefully and consciously coordinated with the land use and development pattern in the County. The fundamental objective of a road system is to provide access and mobility. If roads are not planned near areas of development, the road system will fail to provide adequate access. If roads are not planned with sufficient capacity to serve development, the road system will fail to provide adequate mobility since drivers would experience long delays on the roads and restricted movement.

At the same time, proposals for land development must recognize their implications for the road network. Development of a major employment facility such as a shopping center or industrial park should not locate on local and collector streets. The traffic generated by the development would overtax the facility, leading to congestion, disruption of local circulation, and faster deterioration of the road pavement. A more common occurrence is that an entire area may be opened for development with existing roads that are inadequate to carry the projected traffic. In these instances, both the County and the private sector have obligations to ensure that the development is served at an appropriate level of service.

While land developers should recognize the traffic-carrying capacity of the roads which will provide access to their projects, they must also be aware of the type of traffic it is intended to carry. For example, developers of a shopping facility located on a major arterial should recognize that the function of the road is to provide high-volume through movement. Proposals to cut the curb for a number of driveways to the shopping center would severely frustrate such through movements.

Finally, not only do roads need to be properly located and sized to adequately serve the land use pattern, they must also be maintained. Constant use, coupled with occasional heavy truck traffic, will gradually deteriorate the roadbed. Given that the road network is such a large capital investment, it is desirable to prolong its useful economic life as long as possible. The COG completed a Deferred Maintenance Study in April 1984 which revealed that the cities and the County were not keeping up with road maintenance. Local agencies tended to undertake routine maintenance (such as filling pot holes, cracks, etc.) rather than cyclical maintenance (such as seals, overlays, etc.). In addition, where restoration of the road was called for, local agencies were trying to make do with the less capital intensive cyclical maintenance. Most agencies relied on gas tax funds, which as a source provides insufficient monies. Proper maintenance is an essential component of any program to extend the longevity and use of the road system.

Road Network San Joaquin County is served by an extensive road network. It includes three Interstate Routes (I-5, I-205, and I-580), eight State Routes (4, 12, 26, 33, 88, 99, 120, and 132), as well as local thoroughfares (see Figure II.C-1). These roadways provide access to the surrounding counties (including

the job centers and product markets of the San Francisco Bay Area and the Sacramento region) and to local destinations such as employment areas, shopping centers, cultural/civic facilities, recreational opportunities, and residential communities. Over the past ten years, traffic on the County's local roads has typically been about 20% greater than on the State highways. In 1977, about 330,000 average daily trips occurred on local roads and about 270,000 on State highways. However, this picture has changed over the past two years. Traffic volumes on the State highways surpassed those on local roads for the first time in 1986. As San Joaquin County emerges as an "extended suburb" for the San Francisco Bay Area and as industrial construction increases, considerably more travel is expected on the State highways and interstates.

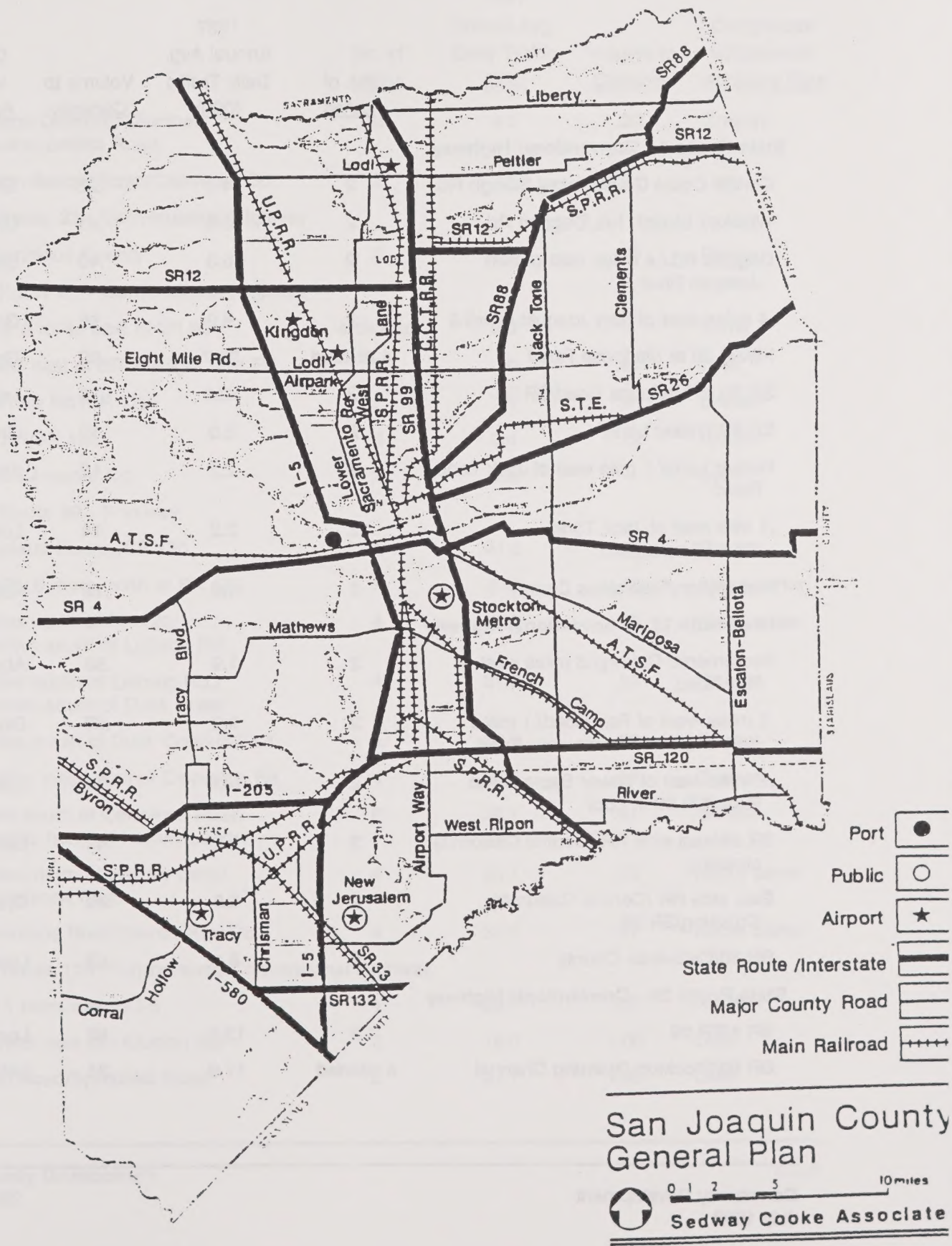
Below is a brief description of each of the major roads serving the County.

Freeways and State Routes. The heaviest travel volumes are found on the Interstates and State Routes that traverse the County. These facilities provide for inter- and intra-regional travel. Travel characteristics (average daily traffic, service level as measured by volume-to-capacity ratios, and accident ratings) are presented for these roads in Table II.C-1.

Interstate 5. This is the major north/south facility serving the County. With six lanes along most of its length, this freeway carried an annual average daily traffic volume in the mid-70,000s in 1988 at its heaviest location. Volumes on I-5 have increased 25% between 1985 and 1987. Approximately 16 interchanges, not all of them with access in all directions, are found along the 35-mile stretch of I-5 within the County. Except for the urbanized portion around Stockton, trucks account for a substantial portion (greater than 15%) of the traffic; within Stockton, the percentage is less than 10%. The annual average daily volumes are well within the capacity of the freeway, except between I-205 and SR 120 where 1987 volumes of over 60,000 resulted in levels of service "D." The stretch through Stockton from Roth Road to Benjamin Holt Drive experiences accident rates greater than those found on comparable roads elsewhere in the State.

Interstate 205. This four-lane, east/west freeway connects Alameda County and the Tri-Valley area with I-5. Five interchanges exist along the thirteen miles of I-205 in the County. Traffic volumes reached about 42,000 average daily trips in 1987, of which 16-20% were by trucks. This volume of traffic is nearly double the volume five years previously. The volumes near the Alameda County border were at about the designed capacity of the road. The COG's 1987 I-205 Capacity Study Report noted that the western half of the road has reached or exceeds threshold levels for minimum operating speed, peak hour v/c ratio, and fatality and injury accident rates. In recognition of these conditions, the Report proposed an eight-lane facility.

Figure II.C-1 MAJOR TRANSPORTATION FACILITIES



**TABLE II.C-1
TRAVEL CHARACTERISTICS OF FREEWAYS AND HIGHWAYS IN SAN JOAQUIN COUNTY**

	<u>No. of Lanes</u>	<u>1987 Annual Avg. Daily Traffic (000)</u>	<u>Volume to Capacity</u>	<u>Comparison w/Statewide Accident Rate</u>
State Route 4 - Conventional Highway				
Contra Costa Co./Whiskey Slough Rd.	2	4.1	.23	Greater
Whiskey Slough Rd./Daggett Rd.	2	5.6	.41	Greater
Daggett Rd./.4 miles east of San Joaquin River	2	6.3	.40	Less
.4 miles east of San Joaquin river/I-5	2	8.9	.55	Greater
I-5/SR 26 at Mariposa Road	4 divided	29.7	.99	Greater
SR 26 at Mariposa Road/SR 99	2	12.8	.73	Less
SR 99/Walker Lane	2	3.0	.19	Greater
Walker Lane/.1 mile east of Jack Tone Road	2	2.2	.12	About Same
.1 mile east of Jack Tone Road/Farmington	2	2.2	.14	Less
Farmington/Stanislaus County	2	1.9	.16	About Same
State Route 12 - Conventional Highway				
Sacramento County/.5 miles west of Ray Road	2	1.9	.55	About Same
.5 miles west of Ray Road/.1 miles east of Lower Sacramento Road	2	9.2	.67	Greater
.2 miles east of Lower Sacramento Road/SR 99 in Lodi	2	14.0	.74	Greater
SR 99/east side RR (Central California) crossing	2	8.2	.49	Less
East side RR (Central California) Crossing/SR 88	2	6.5	.40	Greater
SR 88/Calaveras County	2	5.1	.43	Less
State Route 26 - Conventional Highway				
SR 4/SR 99	2	13.9	.88	Less
SR 99/Stockton Diverting Channel	4 divided	11.9	.24	Less

TABLE II.C-1 (Cont.)
TRAVEL CHARACTERISTICS OF FREEWAYS AND HIGHWAYS IN SAN JOAQUIN COUNTY

	No. of <u>Lanes</u>	1987 Annual Avg. Daily Traffic (000)	Volume to <u>Capacity</u>	Comparison w/Statewide <u>Accident Rate</u>
Stockton Diverting Channel/ Escalon-Bellota Road	2	4.5	.27	Greater
Escalon-Bellota Road/Calaveras Co.	2	3.1	.41	Less
State Route 33 - Conventional Highway				
I-5/Stanislaus County	2	1.9	.17	Same
State Route 88 - Conventional Highway				
SR 99/.6 miles east of SR 99	4 divided	9.8	--	Same
.6 miles east of SR 99/Eight Mile Rd.	2	9.0	.84	Less
Eight Mile Rd./SR 12W	2	7.5	.61	Greater
SR 12W/SR 12E	2	9.4	.72	Greater
SR 12E/Amador Co.	2	5.5	--	Less
State Route 99 - Freeway				
Stanislaus County/SR 120	4	41.8	.68	Greater
SR 120/.6 miles north of SR 120	5	28.0	.45	About same
.6 Miles north of SR 120/ .3 miles south of Lathrop Rd.	4	28.0	.45	About same
.3 miles south of Lathrop Rd./ .5 miles south of Duck Creek	4	31.6	.52	Greater
.5 miles south of Duck Creek/SR 88	4	35.9	.57	Greater
SR 88/.1 mile south of Calaveras Rd.	4	35.9	.57	Greater
.1 mile south of Calaveras River/ .3 miles north of Harney Lane	6	35.7	.41	Greater
.3 miles north of Harney Lane/ Mokelumne River	4	29.1	.46	About same
Mokelumne River/Sacramento Co.	4	33.6	.61	About Same
State Route 120 - Expressway/Conventional Highway				
I-5/1.1 miles east of I-5	4	23.1	.52	Greater
1.1 miles east of I-5/Union Rd.	2	18.0	1.00	Less
Union Road/Spreckels Road	2	21.1	1.00	Less

TABLE II.C-1 (Cont.)
TRAVEL CHARACTERISTICS OF FREEWAYS AND HIGHWAYS IN SAN JOAQUIN COUNTY

	No. of <u>Lanes</u>	1987 Annual Avg. Daily Traffic (000)	Volume to Capacity	Comparison w/Statewide Accident Rate
Spreckels Road/SR 99	2	24.5	1.00	Less
SR 99/.1 mile west of Austin Rd.	3 divided	11.6	.90	Greater
.1 mile west of Austin Rd./ Escalon-Bellota Rd.	2	9.4	.73	Greater
Escalon-Bellota Rd./.1 miles east of Elizabeth-David Avenue	2	11.8	.98	Greater
.1 mile east of Elizabeth-David Avenue/Stanislaus County	2	10.5	.88	Less
State Route 132 Freeway/Expressway/Conventional Highway				
I-580/1.2 miles east of I-580	4	5.7	.14	Greater
1.2 miles east of I-580/.6 miles west of I-5	2	5.7	.50	Greater
.6 miles west of I-5/SR 33	2	8.0	.61	Less
SR 33/Stanislaus County	2	8.5	.79	Less
Interstate 5 - Freeway				
Stanislaus Co./I-580	4	17.0	.30	Less
I-580/Old 50 (Eleventh St.)	4	11.7	.25	Less
Old 50 (Eleventh St.)/I-205	6	20.0	.28	Greater
I-205/SR 120	6	63.0	.81	About Same
SR 120/Roth Road	6	39.6	.55	Less
Roth Rd./SR 4	6	47.0	.54	Greater
SR 4/Country Club	8	59.8	.43	Greater
County Club/March Lane	7	54.2	.49	Greater
March Lane/Benjamin Holt Drive	6	56.0	.49	Greater
Benjamin Holt Drive/Hammer Lane	6	46.0	.44	About Same
Hammer Lane/Break Creek Overflow	6	31.1	.33	About Same
Bear Creek Overflow/SR 12	6	27.5	.26	Less
SR 12/Sacramento County	4	22.0	.39	Greater

TABLE II.C-1 (Cont.)
TRAVEL CHARACTERISTICS OF FREEWAYS AND HIGHWAYS IN SAN JOAQUIN COUNTY

	No. of <u>Lanes</u>	1987 Annual Avg. Daily Traffic <u>(000)</u>	Volume to <u>Capacity</u>	Comparison w/Statewide <u>Accident Rate</u>
Interstate 205 - Freeway				
Alameda County/.2 miles west of Grant Line Road	4	41.6	.94	About Same
.2 miles west of Grant Line Rd./ MacArthur Drive	4	37.4	.70	Less
MacArthur Drive/I-5	4	42.0	.79	About Same
Interstate 580 - Freeway				
I-5/SR 132	4	7.3	.12	About Same
SR 132/Alameda County	4	17.8	.32	About Same

Source: State of California, Department of Transportation, State Highway Inventory Data, 1987 Route Segment Report, Vol. 2, December 1988.

Interstate 580. A four-lane freeway, I-580 passes through the southwest portion of the County for 15 miles and is a major connection to I-5. Its four lanes carried nearly 18,000 annual average daily trips in 1987 at its junction with the Alameda County line. Truck traffic accounts for about 16-20% of the total daily volumes. The volumes have been far below the capacity of the roadway and have remained fairly stable over the past ten years.

State Route 4. This two-lane facility traverses the central portion of the County for nearly 40 miles in an east/west direction, passing through the Delta, Stockton, and Farmington. Traffic volumes have been relatively low except in the Stockton vicinity. Between I-5 and SR 26, with 1987 volumes approaching 30,000, traffic conditions are congested as the road is virtually at capacity (LOS E). This portion of SR 4 will be reduced by the Crosstown Freeway in 1992. For much of its length, SR 4 experiences accident rates equal to or greater than those found on other comparable facilities in the State.

State Route 12. Like SR 4, SR 12 a two-lane conventional highway, offering east/west movement for 28 miles between Contra Costa and Calaveras counties. The highest volumes of 14,000 daily trips in 1987 were found in Lodi at SR 99. Truck traffic was relatively light, except in the eastern portion of Lodi where trucks represented 21-25% of the trips. The central portion of the route through Lodi has experienced accident rates equal to or greater than those found on comparable facilities elsewhere in the State (also, see SR 88).

State Route 26. SR 26 is a two-lane conventional highway, serving eastern San Joaquin County for 20 miles between SR 99 and Calaveras County. Traffic volumes in 1987 were greatest at its western end, between SR 4 and SR 99. In this stretch, the facility had a 1987 level of service "D." Truck volumes accounted for less than 15% of the average daily trips.

State Route 33. A two-lane conventional highway, SR 33 connects I-5 with Stanislaus County, a distance of five miles. Traffic volumes are light along SR 33.

State Route 88. Connecting SR 99 to Amador County, 25 miles to the northeast, this two-lane conventional highway passes through Stockton, Lockeford, and Clements. Traffic volumes ranged from about 6,000 average daily trips near the Amador border to nearly 10,000 at the east end of Stockton. The volumes around Eight Mile Road were near the facility's capacity (LOS D) in 1987. Trucks accounted for 11-15% of the daily trips. The portion between Eight Mile Road and SR 12 had accident rates greater than those of comparable facilities elsewhere in the State. A growing traffic problem is occurring in the Lockeford area on SR 88, especially on holiday weekends when vacation traffic reaches levels of service of "D" and worse.

State Route 99. Paralleling I-5, SR 99 is a major north/south travel corridor in the County, connecting Stanislaus County in the south and Sacramento County in the north. Average daily volumes ranged from 30,000-35,000 trips, except between Stanislaus County and SR 120 where they exceeded 40,000. Accident rates along the entire 40 mile stretch of SR 99 in the County were equal to or greater than the State's average for similar facilities. Truck volumes, ranging from 21-25% of the total daily trips, are common along portions of the State Route.

State Route 120. SR 120 is primarily a two-lane facility, portions of which are considered as a freeway and others as a conventional highway. Passing through Manteca and Escalon, the road connects I-5 and Stanislaus County, a distance of about 21 miles. The western segment, between I-5 and SR 99, had the greatest volumes, ranging from about 18,000 to 24,500 in 1987. Traffic conditions in this stretch are at LOS "F." East of Manteca, truck traffic accounted for less than 10% of the average daily volume. In this portion, traffic volumes of 9,500-12,000 result in levels of service of "D" and "E."

State Route 132. SR-132 traverses the southern part of the County between I-580 and Stanislaus County, a distance of about seven miles. Traffic volumes are relatively light; however, more than 25% are by trucks. A one-mile stretch east of I-580 has four lanes and has experienced accident rates greater than those found on other comparable State highways.

Other Major Roads. The County is served by a number of other intercity, through-traffic arterials. Until recently, they carried the majority of the traffic; however, over the past ten years they have seen that role assumed by the State Routes. As of 1987, these facilities carried about 430,000 trips, or slightly less than half of the total trips in the County.

Unincorporated Areas. North/south facilities include Byron, Tracy Boulevard, Airport Way, Lower Sacramento Road, Jack Tone Road, Clements, and Escalon-Bellota; east/west facilities include Liberty, Peltier, Turner Road, Copperopolis, Mariposa Road, Matthews Road, French Camp Road, Roth Road, Lathrop Road, Louise Avenue, West Ripon, River Road, and Linne Road.

Existing Travel Demand. As part of this General Plan revision, the COG has modeled the transportation network and travel demand. As of 1987, approximately 1.3 million trips were made in the County. Table II.C-2 shows the distribution of those trips by the purpose of the trip. Most trips are for reasons other than going to work or to shop; the average trip length was a little over 10 miles.

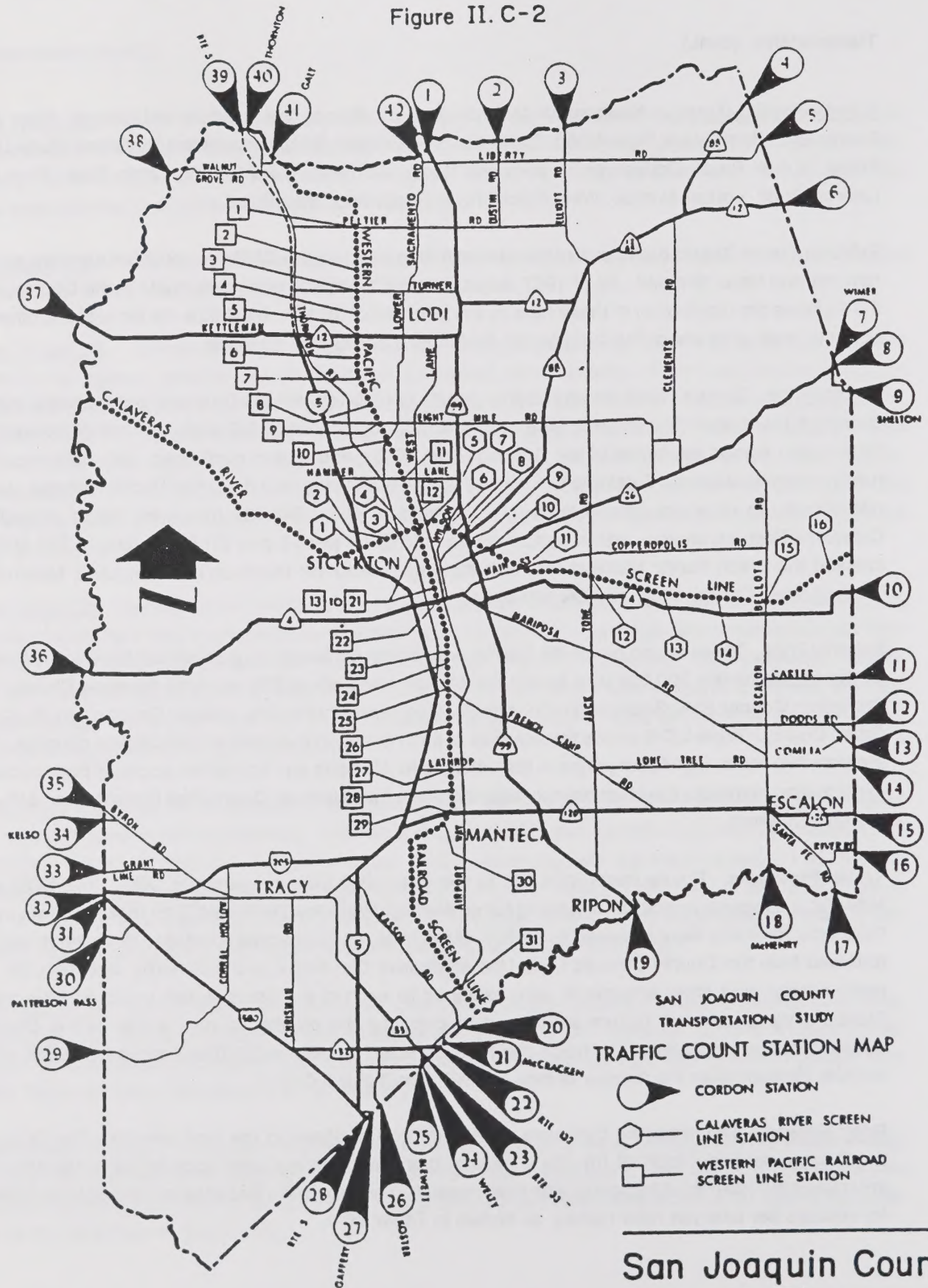
Internal Trips. Current (1990) travel patterns can be quickly understood by examining the traffic volumes passing through identified screenlines (see Figure II.C-2 and Tables II.C-3 and 4). Screenlines are simply lines drawn across key areas of the County. The COG selected two such lines: the Calaveras River, running east/west across Stockton, to measure north/south travel, and the Union Pacific Railroad, running north/south, to measure east/west travel. Count data show 346,800 trips were made through the Calaveras River screenline, with a sizable portion (46%) on just I-5 and SR 99. A total of 355,100 trips crossed the Union Pacific Railroad line, with the largest volumes found on Hammer Lane, March Lane, Harding Way, Charter Way, and SR 120 bypass.

External Trips. Travel in and out of the County was evaluated based on trips across the County borders. Of the approximately 300,000 trips across the County lines, about 23% involved Alameda County; 41%, Stanislaus County; 28%, Sacramento County; 3%, Calaveras County; 3%, Amador County; and 2%, Contra Costa County. Table II.C-5 shows the volumes at each of the connections to surrounding counties. Over the past five years, significant jumps in the volumes to Alameda and Stanislaus counties have occurred. In particular, commute travel across the Altamont Pass into Alameda County has increased by 44% over the last five years.

Travel Forecasts. Future travel forecasts to the year 2010 were prepared by COG. The COG used MINUTP, a computer model, for projecting future Average Weekday Traffic (AWT) on major roadways only. Peak hour forecasts were assumed to be 10% of the total. Land use data needed to drive the model was obtained from the County (revised Land Use Alternative C). Single and multifamily dwelling units and retail, service, and other employees were assigned to each of the County's 605 traffic analysis zones. Standard trip generation factors were used to compute the number of trips made by the County's households and employees. The number of trips projected for the year 2010 total about 2.5 million, nearly an 80% increase over the number of trips in 1987 (see Table II.C-6).

Road Network. The projected trips were distributed and assigned to the road network. The COG and the County reviewed each of the city's general plans and incorporated appropriate, proposed road improvements into the future countywide road network. Each road was classified according to its capacity for vehicles per lane per hour (vplph), as shown in Table II.C-7.

Figure II. C-2



Source: San Joaquin County Council of Governments

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**TABLE II.C-2
1987 TOTAL TRIPS BY TRIP PURPOSE**

<u>Purpose</u>	<u>Total Trips</u>
Home - Other	282,176
Other - Other	413,518
Other - Work	190,564
Home - Work	114,541
Home - Shop	120,845
Internal - External/ External - Internal	149,458
Totals	1,271,102

Source: San Joaquin County Council of Governments, Interpretation of 2010 Traffic Projections, February 1990.

**TABLE II.C-3:
AVERAGE WEEKDAY VOLUME COUNTS FOR CALAVERAS RIVER SCREENLINE**

<u>Location</u>	<u>1976</u>	<u>1980</u>	<u>1985</u>	<u>1987</u>	<u>1990</u>	<u>1980-1990 % Change</u>	<u>1987-1990 % Change</u>
1 Interstate 5	34,600	57,200	56,700	75,100	85,300	49.13%	13.58%
2 Pershing Avenue	21,200	23,200	30,500	30,300	32,900	41.81%	8.58%
3 Pacific Avenue	28,000	19,500	35,600	34,500	35,000	79.49%	1.45%
4 El Dorado	28,800	26,800	32,400	29,100	34,400	28.36%	18.21%
5 West Lane	23,700	27,700	34,400	31,800	35,800	29.24%	12.58%
6 Wilson Way	11,900	10,200	11,100	11,600	15,100	48.04%	30.17%
7 Cherokee Road	5,000	5,700	7,800	7,600	8,000	40.35%	5.26%
8 Waterloo Road	11,500	13,200	15,000	15,400	18,000	36.36%	16.88%
9 SR 99	40,200	33,900	41,400	48,100	72,600	114.16%	50.94%
10 SR 26	6,400	8,300	7,800	8,700	9,700	16.87%	11.49%
TOTALS	211,300	225,700	272,700	292,200	346,800	53.66%	18.69%

TABLE II.C-4:
AVERAGE WEEKDAY VOLUME COUNTS FOR UNION PACIFIC RR SCREENLINE

Location	1976	1980	1985	1987	1990	1980-1990 % Change	1987-1990 % Change
1 Peltier Road	900	1,100	700	1,100	2,000	81.82%	81.82%
2 Woodbridge Road	400	400	300	300	400	0.00%	33.33%
3 Turner Road	1,700	2,200	2,400	2,600	3,700	68.18%	42.31%
4 Sargent Road	700	800	200	300	400	-50.00%	33.33%
5 Route 12	4,500	6,000	9,000	8,600	11,700	95.00%	36.05%
6 Harney Lane	200	300	400	500	600	100.00%	20.00%
7 Armstrong Road	200	300	300	400	500	66.67%	25.00%
8 Davis Road	1,500	1,900	2,500	2,700	3,600	89.47%	33.33%
9 Eight Mile Road	2,500	5,300	6,700	7,900	8,900	67.92%	12.66%
10 Lower Sacramento Rd	8,900	9,600	10,900	10,200	13,700	42.71%	34.31%
11 Hammer Lane	22,600	26,500	37,800	41,800	45,400	71.32%	8.61%
12 March Lane		14,600	23,400	25,500	31,200	113.70%	22.35%
13 Bianchi Road	15,900	8,700	10,400	9,600	11,800	35.63%	22.92%
14 Alpine Road	11,700	11,000	18,200	17,500	18,300	66.36%	4.57%
15 Harding Way	24,000	26,900	25,300	24,700	24,400	-9.29%	-1.21%
16 Park Street	5,000	5,200	5,500	5,000	5,600	7.69%	12.00%
17 Oak Street	4,900	5,500	4,800	4,200	4,700	-14.55%	11.90%
18 Miner Avenue	16,300	14,900	18,300	15,800	14,300	-4.03%	-9.49%
19 Weber Avenue	8,000	12,900	8,000	8,300	10,900	-15.50%	31.33%
20 Main Street	5,800	5,300	6,200	6,000	3,600	-34.55%	-40.00%
21 Market Street	5,800	5,300	5,100	5,000	3,200	-39.62%	-36.00%
22 Hazelton Avenue	6,100	5,300		8,300	7,300	37.74%	-12.05%
23 Crosstown Freeway					27,000		
24 Charter Way	34,400	33,100	39,600	53,100	31,500	-4.83%	-40.68%
25 Industrial Drive	2,300	1,800	2,500	2,700	3,000	66.67%	11.11%
26 Sperry Road	2,400	2,800	3,000	2,900	3,600	28.57%	24.14%
27 French Camp Road	6,300	8,200	8,100	8,400	10,600	29.27%	26.19%
28 Roth Road	3,000	4,200	3,800	3,600	4,800	14.29%	33.33%
29 Lathrop Road	4,600	5,700	6,400	7,700	9,800	71.93%	27.27%
30 Louise Avenue	8,000	10,500	9,400	9,700	10,900	3.81%	12.37%
31 Route 120 (Yosemite)	10,000	11,800	9,000	7,100	8,000	-32.20%	12.68%
32 Route 120 Bypass			23,500	24,700	34,700		72.87%
33 McKinley	1,300	1,600	1,400	1,100	1,600	0.00%	45.45%
34 Airport Way	800	800	1,100	1,300	2,400	200.00%	84.62%
TOTALS	220,700	250,700	304,200	328,600	355,100	41.64%	8.06%

TABLE II.C-5:
AVERAGE WEEKDAY VOLUME COUNTS FOR CORDON STATIONS

Location	1976	1980	1985	1987	1990	1980-1990 % Change	1987-1990 % Change
1 SR-99 @ Sac. Co. Line	31,100	21,400	27,300	32,600	33,100	54.67%	1.53%
2 Dustin @ Sac. Co. Line	300	300	1,200	1,000	1,200	300.00	20.00%
3 Elliot @ Sac. Co. Line	300	300	500	400	500	66.67%	25.00%
4 SR-88 @ Amador Co. Line	3,400	4,500	5,200	5,800	7,000	55.56%	20.69%
5 Liberty @ Amador Co. Line	400	400	500	700	800	100.00%	14.29%
6 SR-12 @ Calaveras Co. Line	3,400	4,500	4,200	5,900	6,100	35.56%	3.39%
8 SR-26 @ Calaveras Co. Line	1,100	1,500	2,000	2,700	3,700	146.67%	37.04%
10 SR-4 @ Stanislaus Co. Line	600	1,100	2,000	1,300	2,800	154.55%	115.38%
12 Dodds @ Stanislaus Co. Line	200	200	300	700	500	150.00%	-28.57%
13 Cometa @ Stanislaus Co. Line	800	800	1,000	1,100	1,100	37.50%	0.00%
14 Lone Tree @ Stanislaus Co. Ln	600	600	700	900	1,100	83.33%	22.22%
15 SR-120 @ Stanislaus Co. Line	6,400	7,800	7,800	9,100	10,200	30.77%	12.09%
16 River Rd @ Stanislaus Co. Ln	1,100	1,400	1,700	2,000	2,300	64.29%	15.00%
17 Santa Fe @ Stanislaus Co. Ln	5,000	5,300	6,700	7,300	8,400	58.49%	15.07%
18 McHenry @ Stanislaus Co. Ln	5,200	7,100	8,400	9,000	10,200	43.66%	13.33%
19 SR-99 @ Stanislaus Co. Line	27,400	25,700	49,100	50,700	72,500	182.10%	43.00%
20 Kasson @ Stanislaus Co. Line	300	400	600	700	1,000	150.00%	42.86%
22 SR-132 @ Stanislaus Co. Line	6,600	7,200	8,200	11,500	13,100	81.94%	13.91%
23 SR-33 @ Stanislaus Co. Line	1,300	1,300	1,300	1,400	1,800	38.46%	28.57%
28 I-5 @ Stanislaus Co. Line	12,500	16,000	15,400	16,400	22,400	40.00%	36.59%
31 I-580 @ Alameda County Line	12,200	14,600	12,900	11,500	11,900	-18.49%	3.48%
32 I-205 @ Alameda County Line	18,100	21,300	38,800	44,900	55,900	165.44%	24.50%
33 Grant Line @ Alameda Co. Line	400	500	900	900	1,800	260.00%	100.00%
35 Byron Rd. @ Alameda Co. Line	2,300	2,500	3,900	4,400	5,700	128.00%	29.55%
36 SR-4 @ Contra Costa Co. Line	3,000	3,300	5,600	4,700	5,700	72.73%	21.28%
37 SR-12 @ Sacramento Co. Line	5,300	6,500	10,000	10,300	13,500	107.69%	31.07%
38 Walnut Grove Rd @ Sac Co. Ln	2,000	2,000	2,600	2,200	2,600	30.00%	18.18%
39 I-5 @ Sacramento Co. Line	0	12,600	19,500	21,700	35,000	177.78%	61.29%
41 New Hope Rd @ Sac Co. Line	900	1,000	1,200	1,100	1,300	30.00%	18.18%
42 Lower Sac Rd @ Sac. Co. Ln.	3,900	4,600	5,600	5,800	7,400	60.87%	27.59%
TOTAL	156,100	176,700	245,100	268,700	340,600	92.76%	26.76%
GRAND TOTAL	588,100	653,100	822,000	889,500	1,061,500	62.53%	19.34%

The following counts were one time 1990 counts shown on the map, but have no history

Calaveras River (Duck Creek) Screenline	AWT	Cordon Stations	AWT
11 Main Street	5,000	29 Corral Hollow @ Alameda Co. Ln.	700
12 Jack Tone Road	2,800	30 Patterson Pass @ Alameda Co. Ln.	500
15 Escalon Bellota Road	1,700	34 Kelso @ Alameda County Line	700
		40 Thornton Rd @ Sacramento Co. Ln.	500

**TABLE II.C-6
2010 TOTAL TRIPS BY TRIP PURPOSE**

<u>Purpose</u>	<u>Total Trips</u>
Home - Other	475,614
Other - Other	771,866
Other - Work	342,595
Home - Work	192,771
Home - Shop	203,375
Internal - External/ External - Internal	311,330
Totals	2,297,551

Source: San Joaquin County Council of Governments, Interpretation of 2010 Traffic Projections, February 1990.

**TABLE II.C-7
CAPACITY CLASSES USED IN THE COG TRAFFIC MODEL**

<u>Type of Road</u>	<u>Capacity (vplph)</u>	<u>Definition</u>
Freeways	1,850	Speeds: 55-65; Lanes = 4 or more
Expressways	900	Speeds: 50 or less; lanes = 6 or more
County Roads	900	Speeds: 40 or more; lanes = 2 only
Arterials	750	Speeds: 50 or less; lanes = 4 only
collectors	600	Speeds: 35 or less; lanes = 2 only
Centroid Connectors	10,000	Any link connecting to nodes 1-799

Source: San Joaquin County Council of Governments, Interpretation of 2010 Traffic Projections, February 1990

Roadway Improvements. In order to accommodate the growth that is forecast in the County between now and the year 2010, numerous roadway improvements will be required. This section identifies the most important improvements that must be made to the County's major arterials, expressways, and State and Federal freeways to retain or achieve the planned level of service, based upon the results of the COG's transportation model runs. In addition to these roadway improvements many transit and rail-related improvements are also included in this General Plan, as identified in later sections of this chapter.

Interstate Freeway and State Route Improvements. The most important, and costly, roadway improvements that must be implemented in San Joaquin county to serve new planned growth over the next twenty years are the addition of lanes and accompanying interchanges to the freeways that crisscross the county and join it to other large metropolitan regions such as Sacramento and the San Francisco Bay Area. Implementation of these major improvements will rely on significant funds provided by the State of California through its State Transportation Improvement Program (STIP). Many of these needed freeway improvements have already been identified by COG, and have been included in their Regional Transportation Plan (RTP).

Table II.C-8 lists the most important improvements to interstate freeways and State highways which have been identified in the Regional Transportation Plan. The San Joaquin County General Plan incorporates all of these proposed RTP projects. In addition, the results of the transportation computer model run testing the growth projected under this General Plan indicate that additional highway projects (primarily more lanes on existing freeways) would need to be implemented to accommodate 2010 land use projections. The additional highway projects that will probably be needed to serve growth through the year 2010 are also identified in Table II.C-8.

The following lists of the RTP and other freeway projects (Table II.C-8), combined with the major arterial improvements contained in Table II.C-9 and transit related improvements identified in Table II.C-10, constitute the proposed improvements of the Circulation Element of this General Plan.

Table II.C-8 identifies those projects that have been formally endorsed by the COG in the most recent RTP. Some of the projects have also been included in the COG's more detailed seven year Regional Transportation Improvement Program (the RTIP). Projects which are not included in either of these documents are noted in the table.

Cost estimates accompanying the individual projects have been developed by various agencies and inflated to current (1990) dollars. It should be noted that many of the estimates are very rough, and may change significantly as more planning studies are completed. Some of the cost estimates for the more undefined, hypothetical projects (such as the needed freeway to freeway interchange at the junction of I-5, I-205, and SR 120) should be used as "order of magnitude" estimates only, and are not based upon any studies.

The major freeway and highway improvements described in Table II.C-8 are highlighted by the completion of the Stockton Cross-Town Freeway from Wilson Way to SR 99, which will include new interchanges at Filbert Street and SR 99. This freeway completion has been included in the STIP and should be finished by 1993, assuming there are State monies to fund it.

No other major freeway or highway projects on the RTP list have received funding from the State of Federal governments. However, several projects have been approved by the COG as "priority projects" which will be submitted to the State for funding in the short term (the next seven year funding period for the State Transportation Improvement Program).

The three "priority" projects for the county identified in the latest COG RTIP are:

- (#1A) upgrading the SR 120 connector between I-5 and SR 99 (the Manteca bypass) to 4 full lanes;
- (#1B) constructing a new 2 lane SR 120 expressway between SR 99 and the Stanislaus County line (the Escalon/Oakdale Bypass);
- (#2) widening I-205 to 6 lanes, with structural improvements (bridges) for 8 lanes; and
- (#3) widening SR 99 to six lanes between Ripon and SR 120.

The Manteca bypass project would widen the existing 3 lane facility to 4 lanes, as well as constructing a new interchange at Union. The Escalon Bypass would be an extension of the Manteca Bypass on a new alignment south of the existing SR 120. Under a joint agreement between the San Joaquin COG and the Stanislaus County Association of Area Governments, the agencies advocate funding to complete the SR 120 improvements, consisting of a bypass constructed around the City of Oakdale. The new Manteca Bypass facility will require a major reconstruction of the existing SR 99/Manteca Bypass interchange. In the 2010 COG model, the Escalon Bypass is assumed to be a 2 lane expressway, rather than a freeway. A single grade separation is assumed, at Austin Road.

Other major freeway improvements which are planned for the fiscal years 1991 through 1997 period in the COG RTIP include the widening of Interstate 205 from four to six lanes, with structures built to accommodate eight ultimate lanes, the widening of SR 99 from four to six lanes between Ripon and Stockton, and the construction or reconstruction of several key interchanges along SR 99 and I-5 in the Stockton area.

Table II.C-8 also identifies additional freeway and State highway projects that may be required to serve the full increment of growth expected by the year 2010, depending on the effectiveness of alternative transportation systems (transit, rail, ridesharing, etc.). The additional lane improvements listed in Table II.C-8 appear to be needed, based upon the volume to capacity (v/c) projections of the COG computer model runs.

It should be noted that the projected deficient capacities of key freeways for the year 2010 are based upon an assumption that no significant amount of work-related and other automobile trips will be decreased by alternative transportation systems. Thus, some of the additional lane improvements in Table II.C-8 may never be required to be constructed, if other TSM, transit and rail related projects are implemented (see the following "Transportation Systems Management" and "Public Mass Transit" sections of this chapter).

TABLE II.C-8:

FREEWAY AND STATE ROUTE IMPROVEMENTS REQUIRED BY GENERAL PLAN 2010

ROAD SECTION	EXISTING (1990) LANES	CURRENTLY PLANNED LANES (LOS) ¹	TOTAL LANES NEEDED BY 2010 (LOS) ²	COST OF PLANNED LANES (MILLIONS OF DOLLARS) ³	COST OF ADDITIONAL LANES (MILLIONS OF DOLLARS) ⁴	TOTAL COST (MILLIONS OF DOLLARS)	COMMENTS ⁵
<u>I-5</u>							
I-205 to SR 120	8	10(F)	12(D)	\$ 4.4	\$ 3.7	\$ 8.1	RTP Project to expand to ten lanes
Construct freeway-to-freeway interchange at SR 120 ⁶	-	-	-	40.0 ⁺ ⁷	-	40.0 ⁺	Not in RTP
SR 120 to Roth	8	8(F)	8(D)	-	28.7	28.7	Not an RTP Project
Roth Road to Elight	8	8(F)	8(D)	-	12.0	12.0	Not an RTP Project
Eighth to Benjamin Holt	6-8	8(F)	10(D)	14.0	16.0	30.0	Partially in RTP
Benjamin Holt to Elight Mile	8	8(F)	8(D)	9.2	-	9.2	Not an RTP Project
Reconstruct March, Hammer, Otto, and Benjamin Holt Interchanges	-	-	-	35.0 ⁺ ⁷	-	35.0 ⁺	
Complete Interchange at SR 12	-	-	-	5.0 ⁺ ⁷	-	5.0 ⁺	
SR 12 to Sacramento County	4	4(F)	8(D)	-	23.2	23.2	Not an RTP Project
<u>I-205</u>							
Alameda County to I-5	4	8(F)	8(D)	48.4 ⁸	13.0	61.4	Number 1 project in RTP (six lanes)
<u>SR 99</u>							
Ripon to SR 120	4	8(F)	8(D)	35.0	16.3	51.3	Six lanes funded in STIP
SR 120 to Mariposa	4	4(F)	8(C)	21.6	-	21.6	RTP Project
Fremont to Elight Mile (Including Interchanges)	4-8	8-8(F)	8-8(D)	125.0 ⁹	-	125.0	Stockton Route 99 segment study estimate
Turner to Sacramento County	4	4(F)	8(D)	-	20.0	20.0	
<u>SR 4</u>							
Cross Town Freeway (Stockton)	0	8(F)	8(D)	\$ 40.0	\$ 8.0	\$ 48.0	Six lanes funded in STIP
Fresno to Roberts	2	2(F)	4(C)	-	2.4	2.4	
Woodsbro to Jones	2	2(E)	4(C)	-	6.5	6.5	
Tracy Boulevard to Contra Costa County line	2	2(E)	4(C)	5.0	-	5.0	
Jack Tone to Farmington	2	4(C)	4(C)	5.0	-	5.0	
<u>SR 12</u>							
Sacramento County line to I-5 ¹²	2	2(F)	4(C)	-	29.0	29.0	
I-5 to Ham	2	4(D)	4(D)	3.0	-	3.0	RTP Project
I-5 to SR 99	2	4(D)	4(D)	10.0	-	10.0	
West of SR 88	2	2(E)	4(C)	1.4	13.0	14.4	RTP Project (upgrading)
<u>SR 26</u>							
Jack Tone to Duncan	2	2(E)	4(C)	-	8.2	8.2	
SR 99 to White Lane	2	2(F)	4(C)	-	4.3	4.3	
<u>SR 88</u>							
Junction SR 12 to Liberty	2	4(F)	6(D)	6.7	6.7	13.4	
SR 99 to Ashley Lane	2	4(F)	6(C)	4.8	4.8	49.6	
Lockeford Bypass ¹¹	0	2(D)	4(D)	30.0 ⁺ ⁷	-	30.0 ⁺	Partially funded RTP Project
SR 88/12 to Amador County	2	2(F)	4(C)	1.9	-	1.9	Not an RTP Project

TABLE II.C-8 (Cont.)

FREEWAY AND STATE ROUTE IMPROVEMENTS REQUIRED BY GENERAL PLAN 2010

ROAD SECTION	EXISTING (1990) LANES	CURRENTLY PLANNED LANES (LOS) ¹	TOTAL LANES NEEDED BY 2010 (LOS) ²	COST OF PLANNED LANES (MILLIONS OF DOLLARS) ³	COST OF ADDITIONAL LANES (MILLIONS OF DOLLARS) ⁴	TOTAL COST (MILLIONS OF DOLLARS)	COMMENTS ⁵
SR 120							
SR 99 to Jackson Avenue (Escalon bypass)	0	2(F)	4(C)	30.0 ¹⁰	32.6	62.6	RTP Project for 2-lane expressway only
I-5 to SR 99 (Manteca bypass)	2	6(D)	6(D)	46.1	—	46.1	RTP Project
SR 132							
I-5 to Stanislaus County	2	4(D)	4(D)	10.0	—	10.0	RTP Project
Totals				\$ 529.4	\$ 309.0	\$ 838.4 ¹³	

¹ These are already planned (but not necessarily funded) freeway and highway improvements that are assumed to be built within the 20-year planning period. Almost all of these planned improvements are included in the 1990 San Joaquin County Regional Transportation Plan, a 20-year planning document, or in the State Transportation Improvement Plan, funded by Caltrans over a seven-year planning period. Levels of Service (LOS) are shown in parentheses.

² Improvements required by Draft General Plan to maintain current LOS D standard in 2010. This assumes a five percent reduction in peak hour traffic due to travel demand management and public transit improvements. Further traffic reductions may avoid the need for some of these improvements.

³ Cost estimates prepared for the San Joaquin County RTP by the SJC Council of Governments, for the STIP by Caltrans, and by San Joaquin County Community Development Department. Does not include any extraordinary right-of-way acquisition costs.

⁴ DKS Associates planning level cost estimates in current (1991) dollars. Does not include right-of-way acquisition costs.

⁵ San Joaquin County RTP (Regional Transportation Plan), 1990; STIP: State Transportation Improvement Program, 1990.

⁶ Hypothetical project involving flyover ramp(s) at SR 120. No studies or cost estimates have been done.

⁷ These are order-of-magnitude costs or rough allowances and not based on any studies.

⁸ Preliminary Caltrans estimate from I-205 Project Study Report.

⁹ Cost based on *Stockton Route 99 Freeway Segment Study*, 1991. Includes cost of improvements to all intervening interchanges.

¹⁰ Assumes San Joaquin portion of two-county project (total cost of \$70 million).

¹¹ Assumes a new alignment for SR 88 bypassing both Lockeford and Clements to the south. A short bypass around Lockeford only is included in the RTP. This cost estimate may be low.

¹² Widening of SR 12 through the Delta may be difficult due to unstable soils.

¹³ This rough estimate includes the cost of all State facilities needed to correct existing deficiencies as well as General Plan growth to 2010.

Source: DKS Associates, Travel Demand Model, San Joaquin County Community Development Department. (revised October, 1992)

Transportation (cont.)

The most significant freeway and State highway projects which may be required to accommodate planned growth over the twenty year period, in addition to those projects already identified in the seven year RTIP, include:

- o the further widening of I-205 from six to eight lanes;
- o the additional widening of SR 120 from four to six lanes (Manteca Bypass) and from two to four lanes (Escalon Bypass);
- o widening of SR 99 to six lanes and then to eight lanes from SR 120 through Stockton, with construction or reconstruction of the interchanges along the route;
- o widening of SR 99 to six lanes through Lodi, from Harney Lane to Liberty Road;
- o widening of I-5 through Stockton from six to eight lanes and possibly to ten lanes, depending on the feasibility;
- o widening of I-5 from SR 120 to Stockton to eight lanes;
- o construction of a freeway to freeway flyover interchange at the junction of I-5, I-205, and SR 120;
- o construction of the Lockeford-Clements Bypass on SR 88;
- o widening of SR 12 to six lanes through Lodi;
- o widening of SR 12 to four lanes from I-5 to the Sacramento County line, if environmental issues (soil instability) can be resolved; and
- o construction of a four lane SR 132 east of I-580.

In the Stockton area, the widening of I-5 and SR 99 will be required in possibly two different phases. The COG transportation computer model assumed that I-5 would be widened to eight lanes from Charter Way to Hammer Lane. However, the modeling results indicate that the facility is significantly over loaded by the 2010 (peak hour volume/capacity ratios of 1.05 to 1.21, or up to 21% over capacity in portions). Thus, Table II.C-8 improvements call for additional widening of I-5 to ten lanes from the Cross-Town Freeway to Hammer Lane, if it is possible. Very high right-of-way acquisition costs and the high cost of replacing or widening the bridge over the Stockton Ship Channel may make this project infeasible, however.

The portion of I-5 between SR 120 in Manteca and Charger Way in Stockton will also be over capacity during the peak hours, according to the COG transportation model results. This portion will need to be widened from six to eight lanes.

Transportation (cont.)

One of the most important roadway improvements which must be constructed sometime during the twenty year planning period is the new freeway to freeway interchange at the junction of I-205, I-5, and SR 120. Initial discussions indicate the need for "flyover" ramp to connect SR 120 to I-205 westbound, or some similar configuration, since the projected traffic volumes in the future cannot be served by simply adding more lanes to this critical interchange. The cost for such a facility, which has not yet been discussed by Caltrans, could conceivably be in the range of \$40 to \$50 million.

SR 99 through the Stockton area would need to be widened from six to eight lanes from approximately the Cross-Town Freeway to Hammer Lane. Major interchange improvements would be required along this route, including a possible March/Hammer super interchange. The Council of Governments, in cooperation with the County and the City of Stockton, is currently finishing up a study of needed improvements to this section of SR 99, which may identify costs and interchange locations more specifically.

In the Lodi area, the latest City plans indicate that six lanes would be required on SR 12 (Kettleman Road) between Lower Sacramento Road and Cherokee Lane, as well as requiring SR 99 to be widened to 6 lanes from Harney Lane northwards through the Lodi area. Neither of these projects is in the COG's 20-year RTP. The COG transportation computer model assumes only that Kettleman Road (Route 12) would be widened to six lanes during the 20 year planning period.

In the Tracy area, in addition to the widening of I-205 two other freeway projects are planned and are assumed to be built within the twenty year planning period. These include a new 4 lane freeway (SR 132) and a new interchange on I-580. SR 132 would be constructed between I-580 and SR 33. This facility would include grade separations (but not interchanges) at Bird Road and at Koster Road. In addition, the COG transportation model assumes that one new interchange will be constructed at I-580 and Tracy Blvd. The location of this interchange could be modified to an extension of Linne road or Lammers Road. On the COG model a new frontage road is also shown, connecting Tracy Blvd., Corral Hollow, and MacArthur at I-580.

In the unincorporated areas of San Joaquin County, significant improvements would be required to SR 12 and SR 12/88. The COG transportation computer model results indicate very high volumes on SR 12 in the year 2010 between I-5 and the Sacramento County line. Much of this traffic is due to anticipated growth in the adjoining counties (primarily in Solano County). Widening this facility to four lanes would be required, but may be difficult or very expensive due to the unstable peaty soils in the Delta.

A major improvement which should be completed to remedy an existing problem is construction of an ultimate four lane bypass on SR 88 around Lockeford and Clements. The COG RTP calls for construction of a bypass around Lockeford only. This facility is already over capacity, especially during summer weekends. Additional growth anticipated in adjoining Amador and Calaveras Counties may make this improvement very important in the short term (the next ten years).

The COG transportation model does not indicate any projected capacity problems on SR 26, except in the vicinity of Linden, where the roadway may need to be widened to four lanes. However, additional commuter traffic originating from the growing residential communities of Valley Springs in Calaveras

County may require improvements to the facility. Safety improvements such as widening existing bridges and straightening curves may be warranted in the future.

Arterial Improvements. Table II.C-9 lists the improvements to major arterials in the urban areas of San Joaquin County, which will be required to support the amount of growth that is projected under this General Plan, as well as address the current deficiencies on already congested roadways. Most of these roadway improvements are already included in the respective city General Plans, and may already be planned or funded by the cities in adopted capital improvement programs. Many of the improvements involve the widening of existing two lane roads into four lane arterials.

A very preliminary cost estimate has been prepared for the improvements required in each of the jurisdictions, based upon a standard cost per mile of upgraded arterial roadway. The costs may not reflect extraordinary costs due to right-of-way acquisitions or other environmental problems.

Table II.C-9 identifies those major arterial links in the Stockton area which would require improvement to achieve a future traffic level of service "D" or better (90% of road capacity used or less). For the other cities, a level of service of "C" has been used to gauge needed arterial improvements. It should be noted, however, that deficiencies on the arterial routes identified in Table II.C-9 may or may not occur, depending upon various complex factors, including the effectiveness of planned transit and rail improvements which will decrease the number of solo auto commuters in the county. The proposed arterial improvements in Table II.C-9 assume that no projected auto trips will switch to transit, other than what is being experienced at the present.

In addition to the proposed widenings of existing streets in Stockton, several new arterial roadways will be constructed in fringe areas of the city in order to serve large new developments already approved by the City of Stockton, such as the Spanos Park, Brookside, and Weston Ranch. These unnamed new arterials on the west and northern sides of the city have not been included in Table II.C-9, since their construction will be entirely funded by the private developers.

Some of the major arterial projects required in the Stockton area include the construction and widening of the Arch Road/Sperry Road facility near the airport; the extensions of Eighth Street and Industrial Drive; the widening of Eight Mile Road to six lanes; construction of the March Lane extension; widening of West Lane to eight lanes; widening of Lower Sacramento and Thornton Roads to six lanes; and the extension of Holman Road.

In addition, the COG transportation computer model indicates that the following facilities could become overloaded by the year 2010, and further improvements may be required. However, it is speculative at this time to indicate specific improvements to these arterials since the implementation of various alternative transportation systems (bus and rail transits, etc.) would affect future traffic projections. the additional arterials which may require improvements include:

- o Airport Way, Fremont to Harding;
- o California, Harding to Alpine;

Transportation (cont.)

- o Charter Way, I-5 to Mariposa;
- o Cherokee, Filbert to SR 99;
- o Eighth Street, El Dorado to Rte 99 (Mariposa);
- o Filbert, Cross-Town Freeway to Flora;
- o Frontier extension, Mariposa to north of Arch Road;
- o Harding Way, Pacific to Wilson;
- o March Lane, I-5 to Pacific and El Dorado to West;
- o Miner Street, California to Airport;
- o Oak Street, Lincoln to El Dorado;
- o Pacific, March to Harding;
- o Pershing, portions south of March and from March to Hammer;
- o West Lane, March to Hammertown Drive, and
- o Wilson Way, Miner to Poplar.

Outside of the Stockton area, the COG transportation computer model indicates that the arterials listed below could be at levels of service below "C", and thus may require additional improvement:

- o in the Lodi area, Lower Sacramento Road from Kettleman to Capell/Turner, and West Lane from Eight Mile Road to Harney Lane;
- o in the Manteca/Lathrop area, Louise and Yosemite Avenues;
- o in the Tracy area, Schulte Road, from Hansen to Corral Hollow.

**TABLE II.C-9
MAJOR ARTERIAL IMPROVEMENTS
NEEDED BY THE YEAR 2010 ⁽¹⁾**

<u>ROADWAY</u>	<u>IMPROVEMENT PROJECT/LOCATION</u>
STOCKTON AREA:	
Airport Way	Widen to 6 lanes- Fremont to French Camp
Arch/Sperry (2)	Construct/widen to 6 lanes- French Camp to SR 99
Arch Road	Widen to 6 lanes- SR 99 to Frontier
Arch Road	Widen to 4 lanes- Frontier to Austin
Benjamin Holt (3)	Widen to 6 lanes- I-5 to Cumberland
Brookside	Widen to 4 lanes- Pershing to Pacific
Cherokee (3)	Widen to 4 lanes- SR 99 to diverting canal
Eight Mile Road	Widen to 6 lanes- I-5 to Sr 99
Eight Mile Road	Widen to 4 lanes- west of I-5 and east of SR 99
Eighth Street	Widen to 4 lanes- Fresno to I-5
Eighth Street (3)	Widen to 4 lanes- Sacramento to B Street
El Dorado	Widen to 6 lanes- Fourth to Ash
El Dorado	Widen to 6 lanes- Fulton to Robinhood
Farmington Road (3)	Widen to 4 lanes- Mariposa to Gillis
Filbert Street (3)	Widen to 4 lanes- Poplar to Miner
Fremont Street (3)	Widen to 4 lanes- I-5 to El Dorado
Fremont Street	Widen to 4 lanes- Stanislaus to SR 99
French Camp Road	Widen to 6 lanes- I-5 to Arch/Sperry
French Camp Road	Widen to 4 lanes- Manthey to I-5
Hammer Lane (3) (4)	Widen to 8 lanes- I-5 to Meadow
Hammer Lane	Widen to 4 lanes- Meadow to El Dorado
Hammer Lane (3) (4)	Widen to 10 lanes-El Dorado to Tam O'Shanter
Hammer Lane	Widen to 6 lanes- Tam O'Shanter to east of SR 99
Holman Road	Widen to 4 lanes- McAllen to March
Holman Road	Construct 6 lanes- March to Eight Mile
Industrial Drive	Widen to 4 lanes- McKinley to Airport Way
Lower Sacramento Road	Widen to 6 lanes- Pacific to Hammer
Lower Sacramento Road (3)	Widen to 8 lanes- Hammer to Ponce de Leon
Lower Sacramento Road	Widen to 6 lanes- Ponce de Leon to Eight Mile
Main Street (3)	Widen to 4 lanes- SR 99 to Cardinal
March Lane (3)	Widen to 10 lanes- I-5 to El Dorado
March Lane (3)	Widen to 8 lanes- El Dorado to West Lane
Mariposa Road (3)	Widen to 4-6 lanes- SR 99 to Munford
Mariposa Road	Widen to 4 lanes- Charter Way to East SR 99 frontage
Pacific Avenue (3)	Widen to 6 lanes- Alpine to Bianchi
Pershing Avenue (3)	Widen to 6 lanes- Harding to Country Club
Pershing Avenue	Widen to 4 lanes- Lincoln to Thornton
Rosemarie (3)	Widen to 4 lanes- Pacific to McGaw

**TABLE II.C-9 (Cont.)
MAJOR ARTERIAL IMPROVEMENTS
NEEDED BY THE YEAR 2010**

<u>ROADWAY</u>	<u>IMPROVEMENT PROJECT/LOCATION</u>
Thornton Road	Widen to 4 lanes- DeVries to Eight Mile
Thornton Road	Widen to 6 lanes- Eight Mile to Davis
Thornton Road	Widen to 8 lanes- Davis to Hammer
Union	Widen to 4 lanes- French Camp Road to Roth Road Extension
Waterloo Road	Widen to 4 lanes- Wilson to Harding
Waterloo Road	Widen to 6 lanes- Harding to Cherokee
Weber Avenue	Widen to 4 lanes- I-5 to El Dorado
West Lane	Widen to 8 lanes- Eight Mile Road to Calaveras River
West Lane	Widen to 6 lanes- Calaveras River to Harding Avenue

LODI AREA:

Widen the following arterials to 4 lanes:

Armstrong	West Lane to SR 99
Cherokee	Almond to Century
Harney	Lower Sacramento Road to SR 99
Kettleman Lane	SR 99 to Guild
Lodi Avenue	Cherokee to Guild
Lower Sacramento Rd.	Eight Mile Road to SR 12
Lower Sacramento Rd.(3)	SR 12 to W. Lockeford (need 6 lanes)
Lower Sacramento	W. Lockeford to Peltier
Lower Sacramento Rd.(3)	Peltier to Sacramento County line
Sergeant Road	Lower Sacramento Rd. to west of Lower Sacramento Rd.
Stockton Street	Kettleman Lane to Harney
Turner Road	Stockton Street to Guild
Turner Road	Mills to Woodhaven
West Lane (3)	Eight Mile to Harney (needs 6 lanes)

LOCKEFORD AREA:

Widen the following arterials to 4 lanes:

Old SR 88/12 (3)	South of Lockeford to Junction SR 88/12
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THORNTON AREA:

Widen the following arterials:

Walnut Grove Road (3)	I-5 to Sacramento County line (4 lanes)
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TABLE II.C-9 (Cont.)
MAJOR ARTERIAL IMPROVEMENTS
NEEDED BY THE YEAR 2010

<u>ROADWAY</u>	<u>IMPROVEMENT PROJECT/LOCATION</u>
MANTECA/LATHROP AREA:	
Widen the following arterials to 4 lanes:	
Airport Way	French Camp Road to Woodward
Austin Road	Lathrop Road to Moffatt
Center Street	Union to Fremont Street
Cottage	Lathrop Road to Louise Avenue
Cottage (3)	Louise to Yosemite
Crestwood	Northgate to Lathrop Road
Industrial	Main street to Spreckels
Lathrop Road	I-5 to Austin Road
Louise Avenue	West of SR 99 to Austin Road
Louise Avenue	I-5 west of Union
Main Street	Woodward to SR 120
Main Street	SR 120 to Yosemite Avenue
Main Street	Yosemite to Northgate (needs 6 lanes)
Woodward	McKinley to Moffatt
Yosemite	Airport to SR 99
Yosemite (old SR 120)	SR 99 to North Ripon Road
TRACY AREA:	
Byron Road (3)(5)	Widen to 4-6 lanes- Patterson Pass to Grant Line Road
Central Avenue	Construct/widen to 4 lanes- 11th Street to Tracy Blvd.
Corral Hollow Road	Widen to 4 lanes- Kavanaugh to Grant Line Road
Corral Hollow Road	Widen to 6-8 lanes- Grant Line Road to Schulte Road
Corral Hollow Road	Widen to 4 lanes- Schulte Road to Valpico
Eleventh Street (6)	Widen to 6 lanes- I-205 to I-5
Grant Line Road (3)(5)	Widen to 4 lanes- Byron Road to Lammers Rd.
Grant Line Road (3)(5)	Widen to 10 lanes- Lammers to west of Corral Hollow Rd.
Grant Line Road	Widen to 6 lanes- Corral Hollow to w/or Corral Hollow Rd.
Grant Line Road	Widen to 4 lanes- Corral Hollow Road to Tracy Blvd.
Grant Line Road (3)	Widen to 6 lanes- Bird to Eleventh Street
MacArthur Drive	Widen to 6 lanes- I-205 to Grant Line road
MacArthur Drive	Widen to 4 lanes- Valpico to Third Street
Patterson Pass (3)(5)	Widen to 6 lanes - I-205 to Grant Line Road
Schulte Road (3)	Widen to 4 lanes- Lammers to Hansen
Tracy Boulevard	Widen to 4 lanes- Center Court to Valpico
Valpico	Widen to 4 lanes- Corral Hollow Road to Tracy Blvd.

**TABLE II.C-9 (Cont.)
MAJOR ARTERIAL IMPROVEMENTS
NEEDED BY THE YEAR 2010**

ROADWAY

IMPROVEMENT PROJECT/LOCATION

RIPON AREA:

Widen following arterials to 4 lanes:

Main Street	Jack Tone road to Wilma
Jack Tone Road	SR 99 to Doak
Yosemite Road (old SR 120) (3)	French Camp to Van Allen

ESCALON:

Widen the following arterial to 4 lanes:

McHenry Avenue (3)	New SR 120 (Escalon Bypass) to Stanislaus County Line
Yosemite Road (old SR 120) (3)	Van Allen to Brennan
Yosemite Road (old SR 120) (3)	West of Escalon

TOTAL COST:

approximately \$500-600 million (7)

NOTES:

- (1) These improvements would be required in order to serve projected twenty year growth, with a Level of Service of "C", except within the Stockton area (LOS D) and on selected road segments in Mountain House; as designated in its Master Plan (LOS D). The growth is projected under the seven city general plans, and the County General Plan, with inclusion of two new communities of New Jerusalem and Mountain House.

These widenings assume that 5% of peak hour trips would be diverted to other alternative modes of transportation (transit, rail, ride sharing, TSM, etc.). If a greater diversion due to alternative transportation systems is achieved by 2010, fewer improvements would be required.

Some of these arterial road widenings may not be possible to construct due to lack of right-of-way, and other environmental or political obstacles.

- (2) The portions of the new Arch/Sperry Road east of French Camp Road and near SR 99 would be on new alignment. This includes relocating the SR 99 interchange to the south.
- (3) These arterial widenings have not been previously planned by the cities or the County. Some of these widenings may not be possible.

TABLE II.C-9 (Cont.)
MAJOR ARTERIAL IMPROVEMENTS
NEEDED BY THE YEAR 2010

- (4) This widening of Hammer Lane may not be possible. An alternative would be to widen Eight Mile Road, now assumed to be six lanes in 2010, to eight lanes.
 - (5) Some of these improvements would only be required if the pending Mountain House new community is approved.
 - (6) A high-capacity 6 lanes by 6 lanes "urban interchange" is assumed for the junction of Eleventh Street (Business I-205) and Corral Hollow Road, and MacArthur Avenue is assumed to be realigned north of Monte Diablo/Third Street through to Grantline Road.
 - (7) This cost figure is based upon separate estimates prepared by the Department of Public Works, DKS Associates, and Psomas & Associates.
-

Transportation Systems Management. It is unlikely that traditional funding schemes will be adequate to sufficiently meet the County's projected growth without transportation systems management strategies. Those strategies include, but are not limited to, traffic, and public transit improvements, ridesharing, incentives for using bicycling and pedestrian facilities, as well as to achieve the goals detailed in the Air Quality Management Plan.

TSM Program. The concept of Transportation Systems Management (TSM) programs is to encourage the most efficient use of existing transportation corridors during peak hour commute periods. TSM recognizes that large scale investments in highway and transit facilities are often limited by financial constraints, as well as adverse community and environmental constraints.

TSM programs typically attempt to reduce the portion of the commute traffic that rides alone in an automobile by encouraging ridesharing (carpooling and vanpooling), the use of transit such as buses and rail, and other forms of non-auto commute such as bicycling and walking. TSM programs also try to shift some of the peak hour commute trips to off-peak periods of the work day through the use of "flex time" work arrangements, which allow employees to arrive and leave at different times during the day and/or to work nine or ten hour days.

Many of the recent TSM ordinances that have been adopted by cities and counties require all large employers to survey their employees once each year and then to prepare and submit a TSM plan to the jurisdiction which must be approved. TSM plans set specific goals, usually expressed in terms of the percentage of employees who commute to work by single occupant auto, as opposed to other modes. For example, a TSM plan for a large corporation located in a business park may strive to reduce the number of employees who commute in single occupant cars by 15% during a one or two year period.

TSM plans usually require employers to appoint an individual as a full- or part-time TSM coordinator, who is responsible for distributing information regarding available transit services to all employees, helping to form car and vanpools, and surveying employees on a regular basis. TSM programs often use incentives

and disincentives to encourage employees to use alternatives to solo auto commuting, such as providing close-in, convenient parking spaces for those who carpool; giving out employer subsidized transit passes; providing bicycle storage racks, or lockers, and shower facilities on-site to encourage bike commuting; charging parking fees to those who drive alone; and providing van buses free of charge.

The implementation of TSM policies may require individual developers to modify individual projects to accommodate TSM-related facilities. For example, as a condition of approval for a large subdivision a developer may be required to construct and site an enclosed bus stop in a convenient location. Developers may also be required to provide pedestrian and bicycle paths to facilitate non-auto travel to nearby services or jobs, or to set aside land for a park and ride lot. Some jurisdictions have required developers to dedicate a portion of a business park adjacent to a rail line for a future transit station.

Other public agencies such as Caltrans may also be involved in TSM programs. Caltrans may be involved in ridesharing programs on a regional basis. The agency is also involved through its road construction activities. When additional capacity is needed on State highways or Interstate freeways, the agency now considers the possibility of constructing or converting lanes for high occupancy (ridesharing) vehicles (HOV). Numerous HOV lanes have been built recently in the State, with the intent of reducing commute times for buses and carpools along congested corridors, although no HOV lanes have yet been constructed in San Joaquin County.

The adoption and successful implementation of Transportation Systems Management programs will become increasingly more important during the 1990's, as more stringent air quality control legislation forces communities to reduce air emissions due to auto commuting. Specifically, the California Clean Air Act adopted in 1988 requires Air Pollution Control Districts in non-attainment areas to prepare a plan by July 1, 1991 which will specify how mobile (autos and trucks), stationary (industry), and indirect sources of air pollution can be reduced to acceptable levels by 1997.

The San Joaquin County Air Pollution Control District estimates that mobile sources of emissions will have to be reduced by 5% to 10% per year to meet acceptable standards for ozone, carbon monoxide, and particulate matter by the 1997 deadline. An important part of the required air quality management plan will be an analysis of mobile sources of emissions, aptly called a Transportation Control Measure (TCM) Plan.

The TCM plan must include a list of recommended measures; a schedule for implementing the measures; the potential implementing agencies; and procedures for monitoring the effectiveness of and compliance with the plan. The County Air Pollution Control District has delegated the responsibility for preparing the TCM plan to the San Joaquin County Council of Governments.

Ridesharing. Ridesharing services for San Joaquin County are provided by the Council of Governments under Caltrans. Services are delivered to call-ins and employer outreach programs, as well as other marketing/informational activities. The goal of the ridesharing program is to serve 130 work sites and process 1,700 applications annually. Employer outreach services are limited to those worksites within San

Transportation (Cont.)

Joaquin County; however, COG/Ridesharing staff also process call-in applications from Stanislaus, Tuolumne, and Calaveras counties. In FY 1987/88, the Ridesharing program processed 1,470. Using a placement rate of 21%, it is estimated that 91 carpools were formed and 541 people placed in ridesharing situations. This resulted in a reduction of 9,843,100 vehicle miles traveled, 502,200 gallons of fuel reduced, 238 tons of pollutants that were not emitted into the air and a user cost savings of approximately \$4,774,000.

Because of the multi-jurisdictional nature of the clients served, the Council of Governments staff coordinates with other ridesharing offices including Rides for Bay Area Commuters, Sacramento Rideshare, and Merced Rideshare.

Park and Ride. To facilitate ridesharing opportunities, Caltrans District 10 has a park and ride lot program. This program consists of lots owned and maintained by the state, lots leased to the state, and lots made available by the private sector.

The goal of the District 10 Park and Ride program is to provide facilities throughout the district. District 10 encompasses not only San Joaquin County, but Stanislaus, Amador, Solano, Merced, Calaveras, Tuolumne, Mariposa, and Alpine counties. In order to achieve that goal, three objectives have been identified:

- o Implement projects in areas of maximum need.
- o Implement projects affording the maximum return for the dollars spent.
- o Implement projects enjoying local public and political support.

These goals and objectives are used to develop and update the district's five year park and ride Project Development Program. As new projects are presented, they are ranked according to their compliance with the goal and objectives. The project with the greatest return is then added to the five-year program.

There is limited funding for this program which means very few new park and ride lots are planned in the near future. Generally, one project uses all funds available to the district for each year. Given this lack of funding, and the increasing need for park and ride lots, the County, local communities and developers will need to work closely with Caltrans and the Stockton Metropolitan Transit District (SMTD) to insure adequate park and ride facilities. In the future, more consideration will need to be given to identifying potential park and ride facilities as part of new developments.

In San Joaquin County, there are four park and ride facilities totaling 148 spaces. Three of the lots are on state-owned property while the fourth is leased from an American Legion post. According to Caltrans estimates in December 1987, approximately 103 or 70% of the 148 spaces are regularly occupied.

Assuming that all available park and ride spaces (82) in District 10's jurisdiction were occupied daily, district staff estimate that 11.6 million vehicle miles traveled (VMT) could be saved annually. This VMT reduction correlates directly to fuel and user savings totaling 613,000 gallons and \$3.3 million, respectively, and pollutant reduction of nearly 600,000 pounds.

The park and ride lot program has the potential of saving users millions of dollars, and the cumulative impact on state and local government is that park and ride lots, in conjunction with other TSM programs, can more efficiently utilize existing facilities.

Traffic Flow Improvements. This tactic relies upon various traffic engineering techniques to improve vehicle operating conditions by decreasing idling time and increasing the speed of traffic. Traffic flow improvements include signal synchronization, use of one-way streets, traffic channelization, computerized traffic control, removal of unnecessary signalization and stop signs, and traffic engineering improvements, such as street widening and addition of lanes. Construction of new routes such as the Crosstown Freeway also helps to improve traffic flow and reduce emissions and energy consumption.

The emissions reduction from traffic flow improvements in 1987 has been estimated at 0.055 tons per day of hydrocarbons, and 0.388 tons per day of carbon monoxide, according to the 1982 AQMP. The fuel savings from traffic flow improvements in 1987 have been estimated at 433.55 gallons.

3. PUBLIC TRANSIT

Existing Services. The County provides transit services to the elderly and handicapped. The system, known as the County Area Transit, does not have regularly, scheduled service but operates in response to calls for service. In addition, CAT offers general demand response in the unincorporated areas of French Camp, Lathrop, and Manteca. The County contributes funds to the local transit districts for service to the nearby unincorporated areas. The County system carried about 61,300 passengers in 1987-88, and an estimated 66,000 in 1988-89.

Public transit services are also available in all six of the incorporated cities as summarized below:

Stockton	Stockton Metropolitan Transit District (general public fixed route, plus commuter service to Lawrence Livermore National Laboratories) - about 2,649,700 riders in 1987-88 and 2,520,500 in 1988-89
	SMTD Dial-A-Ride (elderly and handicapped demand response) -about 47,400 riders in 1987-88 and 49,500 in 1988-89
Lodi	Lodi Dial-A-Ride (general public demand response) - about 75,800 riders in 1987-88 and 77,750 in 1988-89

Transportation (Cont.)

Manteca	Manteca Subsidized Taxi Program (elderly and handicapped subsidized taxi) - about 24,700 riders in 1987-88 and 27,600 in 1988-89
Tracy	Tracy Trans (general public demand response) - about 47,300 riders in 1987-88 and 52,600 in 1988-89 Tracy Taxi (elderly and handicapped demand response) - about 14,900 riders in 1987-88 and 15,500 in 1988-89
Ripon	Ripon Transit System (general public demand response) - about 680 riders in 1987-88 and 670 in 1988-89
Escalon	Escalon Public Transit System (general public demand response, operated by the Stockton District) - about 9,400 in 1987-88 and a slight increase in 1988-89.

Needed Improvements. The COG, as the transportation planning agency, is responsible for undertaking a regional transportation planning process with input from the local agencies. The RTP is a compilation of several documents, including the County's Five-Year Transit Plan (for CAT); the Stockton Metropolitan Transit District's Five-Year Plan Update; the local transit plans for Lodi, Tracy, Manteca, Ripon, and Escalon; and periodic unmet transit needs assessment by the COG.

Provision of transit service depends on the development pattern, the land use densities, the level of car ownership, and the incomes of the households within a service area. The combination of concentrated employment centers and higher residential densities makes transit more cost and energy efficient. At residential densities below 4 dwelling units per acre, it is not possible to economically maintain bus service, even at one-hour headways. If service were possible, the lengthy duration between buses would tend to discourage most potential transit riders. At densities of 7 dwelling units per acre, it becomes feasible to consider local buses running on half-hour headways.¹ Given this relationship between development densities and service availability and frequency, it is understandable why only Stockton and Tracy have regular fixed route service, and why most services are demand response Dial-A-Ride (DAR) systems.

Of critical importance over the next 20 years is the improvement of transit connections, not only within the County, but also the adjacent counties, particularly Alameda. Current traffic volumes result in a level of service E at the County line along Interstate 205. Continued rapid economic development in the Tri-Valley region of Alameda County means many more people will be looking to San Joaquin County for affordable housing and many more commuters will be crossing Altamont Pass. Transit offers an opportunity to remove some of the cars from the road, thereby reducing congestion, energy consumption, and air pollutant emissions.

The COG-prepared 1987 assessment of unmet transit needs identifies the following issues to be of top priority:

Transportation (Cont.)

- o development of an intercity transit network for the County based on the studies by the Stockton Metropolitan Transit District and CAT;
- o for Lodi, intercity service to Stockton, plus Sunday and evening service, shorter waiting times, and greater publicity about transit service;
- o for Escalon, intercity service to Modesto, plus Saturday service and service to the adjacent unincorporated areas;
- o for Ripon, driver training programs;
- o for Manteca, wheelchair service and fixed route service within the city; and
- o for Tracy, intercity service to Stockton and French Camp, plus wheelchair service.

The role of the Stockton Metropolitan Transit District is significant in the long-range transportation system of the County. The District currently provides commuter service to a major employment center, Lawrence Livermore Laboratories, outside the County. It is the only operation capable of providing intra- and inter-County service, although funding would continue to be a major obstacle. To be effective at diminishing the number of single-occupant vehicles on the road, the COG, County, and cities will also need to consider other alternatives, including expanded ridesharing programs, dedicated lanes for high occupancy vehicles like vans and buses, and rail service.

4. PASSENGER RAIL SERVICE

Existing Services. Rail passenger service provides an attractive and energy-efficient alternative to the automobile for intercity travel. Since 1971 most intercity passenger trains in the United States have been operated under the Amtrak system. San Joaquin County is presently served by four San Joaquin trains per day, one each way in the morning and evening. These trains run between Oakland and Bakersfield, stopping in Merced, Fresno, and several other San Joaquin Valley and East Bay cities. Passenger volume on the trains was about 324,620 in 1987, with slightly more than 10% boarding at the Stockton station. Bus connections at both ends of the route provide service through to San Francisco and Los Angeles. The San Joaquin trains which serve San Joaquin County are funded jointly by the federal and state governments.

In San Joaquin County, the trains stop at the Amtrak station at 735 South San Joaquin Street, in Stockton. The station is served by SMTD fixed route and dial-a-ride service, although transit service ends too soon to provide connections with the evening northbound train. Dedicated buses (open only to rail passengers) to and from Davis and Sacramento connect with the San Joaquin trains at the Stockton station. One bus each way per day connects to Marysville, Oroville, and Chico. A new dedicated bus service began in the summer of 1986 connecting the Stockton station with the Tri-Valley area at Livermore,

the Bay Area Rapid Transit station at Fremont, and the South Bay/Silicon Valley at the San Jose Caltrain station. The San Joaquin trains also stop at Riverbank in Stanislaus County, a convenient boarding point for residents in the southeastern part of San Joaquin County.

Potential Changes. Three major proposals, currently under varying levels of consideration, would have significant effects on rail passengers service in the County. They are generally described below.

- o Abandonment of Santa Fe lines. Santa Fe Railroad is studying the feasibility of abandoning the route currently used by the San Joaquin trains between Stockton and Martinez. If this move is made, Amtrak would be required to transfer to the Southern Pacific tracks south of Stockton at Lathrop.
- o Third Train to Sacramento. Caltrans and Amtrak have been considering addition of a third train in the San Joaquin Valley with service to Sacramento. Funding, scheduling, and equipment problems need to be addressed before this service becomes a reality.
- o Bay Area Connection. Recent attention has been given to the increasing number of commuters who cross the Altamont Pass between San Joaquin County and the Livermore Valley. Although merely in the conceptual stages, there have been discussions about extending commuter train service from the Bay Area across the Altamont Pass. No formal proposals have been made, but the opportunities do exist using existing abandoned rail lines.

The County needs to continue the existing strong support for future passenger rail facilities in San Joaquin County, and work towards an integrated transit system that relies upon convenient and frequent intercity and intercounty bus service that will complement rail service.

In the short term period (the 1990's), the goal of the County is to support the development of multi-modal rail stations in Stockton, Lodi, Manteca, and Tracy. In the initial phase, these multi-modal stations would house park and ride capabilities coupled with commuter bus and express bus service. During this period, it is hoped that a passenger rail system would be developed along existing freight rail corridors that would eventually be upgraded to provide 77 mile per hour direct service to Sacramento and to the San Francisco Bay Area. The goal for the short term is also to develop a complementary bus system that would link all communities in San Joaquin County with fixed routes. This bus service would also be directly linked to airport and rail facilities.

During the second half of the planning period (the first decade of the 21st century), the goal is to upgrade the rail service between the county and Sacramento, the Bay Area, and Los Angeles to competitive 125 mile per hour service along existing or new alignments. Within the county, rail service would offer a significant alternative for commuters.

Bus service would continue to be expanded, to provide access from the smaller outlying communities in the county and to link the intra-city transit systems. The multi-modal stations in each city of San Joaquin

County would be upgraded to eventually provide cross platform transfer capabilities, whereby travelers could transfer from local to regional train/bus systems with a minimum of effort.

5. TRANSIT IMPROVEMENTS

Table II.C-10 lists the transit improvements that are needed by the year 2010. It should be noted that the cost estimates for future transit systems are very preliminary and are prorated for San Joaquin County's proportionate cost, from larger engineering studies and capital improvements programs.

Rail Service. It is anticipated that significant monies will become available in the short term for rail projects in San Joaquin County. These monies will come from allocations through the rail section of the State Transportation Improvements Program, from recently passed voter initiatives, and from the recently adopted countywide one half-cent sales tax for transportation improvements.

Recent legislation (AB 471 adopted in 1989) created the Commuter and Urban Rail Transit Program and the Intercity Rail Program. The new law specified rules for including rail projects in the Regional Transportation Improvement Program (RTIP) and the State Transportation Improvement Program. As defined, Intercity rail projects are to be included in the State program and Commuter and Urban Rail projects are to be included in the RTIP. Commuter and Urban Rail projects require that local jurisdictions provide a 50% match of local funds, while 100% of the funding for Intercity projects is provided by the State and Federal governments.

The San Joaquin County Council of Governments, Stanislaus Area Association of Governments, Merced County Association of Governments, and the City of Manteca have recently joined together to nominate the same three projects for the State Transportation Improvement Program:

- o transfer of the San Joaquin AMTRAK train service from the Atchison, Topeka, and Santa Fe tracks to the Southern Pacific tracks;
- o establishment of intercity rail service into the San Francisco Bay Area over the Union Pacific tracks; and
- o establishment of a high speed rail system in the Central Valley that passes through or near the major population centers.

San Joaquin County has most recently submitted a Transit Capital Improvement application package to the State government, requesting a \$3 million track connection between the ATSF and SP tracks in downtown Stockton; \$5.8 million for construction of a Stockton intermodal facility; and \$115 million for track upgrade to 125 mph and construction of additional rail stations.

Passage of Propositions 111 and 117 by the voters in June, 1990 is expected to result in approximately \$300 million being allocated to San Joaquin County for specified rail projects along the Sacramento-Fresno and Stockton-Bay Area corridors. In addition, the preliminary expenditure plan that has been developed for the one half-cent sales tax initiative, passed by the voters in the November 1990, designates approximately \$60 million in sales tax revenues for rail projects, including multi-model stations.

A policy to establish intercity rail service of 79 mph in the short term, and 125 mph in the long term, will incur total capital costs in the county in the range of about \$500 million (in 1990 dollars). Table II.C-10 contains estimated costs to upgrade rail trackage in San Joaquin County in incremental steps from 79 mph to 110 mph to 125 mph. Additional estimates are also included for four rail stations in Stockton, Manteca, Lodi, and Tracy and for rolling stock.

It should be noted that several studies are now underway to define and estimate the costs of high speed rail improvements along corridors linking Sacramento and Los Angeles, and the Central Valley and the Bay Area. The costs in Table II.C-10 are very preliminary in nature and are "order of magnitude" estimates only.

Bus Transit. It is more difficult to come up with cost estimates for an integrated bus transit system which will effectively serve growth anticipated under this General Plan, since operating costs that are not paid through fare box receipts account for such a large portion of the total cost of running the system.

Stockton Metropolitan Transit District has not prepared any long range improvement plan which charts a course over the twenty year planning period. However, the agency has recently prepared a very preliminary estimate of the total costs of significantly upgrade the existing fixed route bus service in the greater Stockton area by adding 57 buses and cutting headways (increasing frequency of buses) by 50% during the 1990's. This estimate, approximately \$300 million, is included in Table II.C-10. This high estimate includes operating costs, as well as capital costs.

There are no estimates for bus transit costs to serve the outlying communities. For the purpose of the accompanying table, these additional transit system costs have been estimated at approximately \$50 million over the planning period. All estimates are in constant 1990 dollars.

TABLE II.C-10

PROPOSED TRANSIT IMPROVEMENTS THROUGH THE YEAR 2010

<u>Transit Facility/Location</u>	<u>Cost ⁽¹⁾ Millions</u>	<u>Comments</u>
RAIL SERVICE:		
<u>(79 MPH SERVICE)</u>		
Stockton-Sacramento	\$ 6.1	21 miles of track, w/o SP-ATSF connection
Stockton-Fresno	6.5	25 miles of track
Stockton-Oakland	<u>5.5</u>	17 miles of track
Sub-total	\$ 18.1	
<u>(110 MPH SERVICE)</u>		
Stockton-Sacramento	\$ 103.5	
Stockton-Fresno	<u>104.3</u>	
Sub-total	\$ 207.8	
<u>(125 MPH SERVICE)</u>		
Stockton-Sacramento	\$ 35.2	
Stockton-Fresno	47.0	
Stockton-Altamont	<u>70.0</u>	28 miles of track
Sub-total	\$ 152.2	
Sub-total: trackwork and structures for 125 mph	\$ 378.0	
6 stations	20.0	
8 train sets	10.0	
Operations and Maintenance	<u>130.0</u>	
Total (125 mph Service)	approximately \$538 million	

TABLE II.C-10 (cont.)

PROPOSED TRANSIT IMPROVEMENTS THROUGH THE YEAR 2010

<u>Transit</u>	<u>Cost ⁽¹⁾</u>	
<u>Facility/Location</u>	<u>Millions</u>	<u>Comments</u>
 <u>185 MPH SERVICE</u>		
Stockton-Altamont	\$ 390.0	Trackwork and structures
16 train sets (systemwide)	25.0	
Operations and maintenance	<u>130.0</u>	
Sub-total	\$ 545.0	
TOTAL - All rail	Approximately \$ 1,083 billion	
 TRANSIT		
Countywide bus service	\$ 628.0	Assumes intra-city, inter-city, and inter-regional service
 GRAND TOTAL - 125 mph rail and bus	 Approximately \$1,116 billion	
GRAND TOTAL - 185 mph rail and buss	Approximately \$1,711 billion	

Notes:

- (1) Cost estimates are in constant 1991 dollars. The cost estimates are very preliminary, and are taken from various sources, including prorating San Joaquin County's portion of larger rail system estimates. Sources include, for rail: AB 971 High Speed Rail Study (Parsons, Brinkerhoff, Quade & Douglas, Inc., June, 1990); for bus: draft SJC Council of Governments Transit Systems Plan (Parsons, Brinkerhoff, Quade & Douglas, Inc., April, 1992); and draft Measure K Strategic Plan (Parsons, Brinkerhoff, Quade & Douglas, Inc., April, 1992).

6. COSTS AND REVENUES FOR MAJOR ROADWAY AND TRANSIT IMPROVEMENTS

Based upon the preceding analysis and estimate of costs for the proposed State highway, freeway, major arterial, rail, and bus improvements, an assessment can be made of the costs and revenues anticipated during the twenty year planning period. This assessment of gross costs and the expected revenues that can be applied to the costs is presented in Table II.C-11.

It should again be noted that the costs and revenues identified in the table are very preliminary. The costs for the roadway and transit improvements are based upon the existing information, which in some cases are "order of magnitude" estimates only, and are not based upon specific engineering studies. The total improvement costs for the County's highways, freeways, and arterials include the cost of fixing existing problems, as well as adding new facilities to serve growth allowed under the cities' and County's General Plans.

On the revenues side, Table II.C-11 identifies those sources of funding that the County and cities are anticipating during the twenty year period, based upon the following sources: revenues from the increased gas tax and the rail bond measures, approved by the voters in 1990; the assumed approval of a countywide program of traffic impact mitigation fees (similar to the program now in effect under County jurisdiction); the revenues from Measure K local one-half-cent sales tax for transportation improvements; revenues from the recently passed Federal Intermodal Surface Transportation Efficiency Act (ISTEA); and revenues from anticipated miscellaneous Federal and State transit operation assistance programs and from fare box receipts.

Table II.C-11 indicates that the anticipated costs of roadway and transit improvements, maintenance, and operating costs will amount to approximately \$3.1 to \$3.3 billion over the twenty year planning period. Revenues over the same twenty year period are anticipated to be approximately \$1.74 billion. Thus, there may be a shortfall in terms of the funds needed for roadway improvements and maintenance costs of approximately \$1.1 to \$1.25 billion, if no additional funding sources are identified during the twenty year period. The shortfall for transit improvements may be much less, up to approximately \$275 million. The latter shortfall is relatively small because a significant amount of State and Federal funding is expected to be available, in contrast to roadway improvements.

TABLE II.C-11
COSTS AND REVENUES FOR PROPOSED
TRANSPORTATION IMPROVEMENTS ⁽¹⁾
(In millions of 1990 dollars)

COSTS	CURRENT DEFICIENCIES(2)	PROPOSED IMPROVEMENTS(3)	TOTAL COSTS
State highways/Interstates	\$ 170	\$ 630 - 680 (4)	\$ 800 - 850
Arterials	\$ 150	\$ 500 - 600 (4)	\$ 650 - 750
Maintenance (5)	\$ 220	\$ 270	\$ 490
Sub-totals: roads	\$ 540	\$ 1,400 - 1,550	\$ 1,940 - 2,090
Rail Service to 125 mph	n/a	\$ 540	\$ 540
Bus Service	\$ 55	\$ 575	\$ 630
Sub-total: transit	\$ 55	\$ 1,115	\$ 1,170
TOTAL	\$ 595	\$ 2,515 - 2,665	\$ 3,110 - 3,260

REVENUES	Revenues Expected
Traffic Impact Mitigation Fees (6)	\$ 225
Increase in State Gas Tax (Proposition 111)	265
State/Local Partnership Program	25
Measure K Local Sales Tax	
• Local roads and maintenance	140
• Regional road improvements	100
• Rail improvements	60
• Other transit improvements	70
• Grade separations	30
Intermodal Surface Transportation Efficiency Act	120
Rail Bonds	300
Miscellaneous Transit Operation Assistance	275
Fare Box Receipts (bus, rail)	125

TABLE II.C-11 (Cont.)
COSTS AND REVENUES FOR PROPOSED
TRANSPORTATION IMPROVEMENTS
(In millions of 1990 dollars)

REVENUES		Revenues Expected	
Sub-total:	revenues for roads	approximately	\$ 840 million
Sub-total:	revenues for transit	approximately	\$ 895 million
TOTAL REVENUES		approximately	\$ 1.735 billion

TOTAL SHORTFALL:			
	roads	approximately	\$ 1.1 - 1.25 billion
	transit	approximately	\$ 275 million

Notes:

- (1) Estimates are very preliminary and may not be based upon specific engineering studies (see text). All estimates are prepared by San Joaquin County Public Works and Community Development Departments, taken from various sources.
- (2) Includes capital costs of correcting existing deficiencies, plus deferred maintenance.
- (3) Estimates from previous tables, rounded off.
- (4) These costs would be required to serve all twenty year growth projections associated with the seven city General Plans, and the County General Plan, including the two new communities. If less than three new communities are approved, fewer Caltrans and arterial improvements would be required.
- (5) The County has an existing maintenance backlog of \$113 million, with an annual increase of \$7 million. City estimates for maintenance backlog were calculated using the same percentage of deficit, after factoring in the difference in lane mileage. The maintenance estimates do not include twenty year rehabilitation and reconstruction, only maintenance costs, for State (Caltrans) facilities.
- (6) Assumes that all jurisdictions have adopted impact fees similar to those already adopted by the County.

7. AVIATION

Airports. San Joaquin County's aviation system presently consists of three publicly operated and three privately operated airports which are open to use by the general public. In addition, there are non-public access facilities, including the federal airport at Sharpe Army Depot, private airstrips, and the hospital heliports. Services offered at the public-access airports include scheduled airline passenger service and air freight service, airline training flights, military training and support operations, fire suppression aircraft operations, and agricultural and other general aviation activities. Table II.C-12 presents operational characteristics of each of the airports in the County.

Stockton Metro. Stockton Metropolitan Airport (Stockton Metro) is located on the southern edge of the City of Stockton, adjacent to Airport Way, and about four miles north of the City of Manteca. Stockton Metro is the only airport in San Joaquin County capable of handling large jet aircraft. Two airlines presently serve Stockton Metro, offering direct flights to and from San Francisco, Los Angeles, and Orange County with 20 airline passenger operations per day on weekdays, and slightly fewer per day on weekends. It functions as the airline terminal for San Joaquin County and is used for airline training, military training and support, and forest and brush fire suppression aircraft operations. In addition, Stockton Metro accommodates business jets and general aviation aircraft. A number of corporations which use aircraft in their business activities are located at Stockton Metro.

Because of its size and location, Stockton Metro will continue to play a major role in the County's aviation system. Surrounded by compatible land use development, the airport should continue to enjoy commercial air freight and business-related general activities. Since airline deregulation, however, the airport has not been as attractive to the large jet airliner operations. Prior to deregulation, commercial airline operations reached a high of 8,500 in 1976, with many of these by large jets. While the number of operations is slightly greater now, the proportion of large jet airliner operations is lower (about 3,540 scheduled jet operations in 1986).

Tracy Municipal Airport. Tracy Municipal Airport is located to the southwest of Tracy. Owned by the City of Tracy, it serves as an alternative to Stockton Metro for business-related aviation, and serves agricultural and other general aviation activities. The City of Tracy is engaged in a program of facilities expansion at Tracy Municipal and is actively seeking to attract based aircraft.

Lodi Airport (formerly Lind's Airport). Lodi Airport is located about three miles north of Lodi on State Route 99. The privately owned airport can accommodate all general aviation aircraft and some business jets. It is used for agricultural and other general aviation activities. Lodi Airport also accommodates ultralight aircraft and parachute jumping, which are not ordinarily allowed at other airports in the County.

Kingdon Airpark. Kingdon Airpark is located about three miles southwest of Lodi and five miles northwest of Stockton on Thornton Road. Privately owned, it can accommodate small twin-engined airplanes and other general aviation aircraft and is used for agricultural and other general aviation activities.

**TABLE II.C-12:
PUBLIC ACCESS AIRPORTS IN SAN JOAQUIN COUNTY**

	Number Runways	Main Runway Length	Main Runway Weight Cap (lbs)	Largest Aircraft Accommodated
Stockton Metro	2	8,650	270,000	Large jet transport.
Tracy Municipal	2	3,418	12,500	All general aviation; some business jets.
Lodi Airport	2	3,090	12,500	All general aviation; some business jets.
Kingdon Airpark	1	4,000	12,500	Light twin-engine craft.
Lodi Airpark	2	2,705	12,500	Single-engine craft.
New Jerusalem	1	4,000	12,500	Light twin-engine craft.
Lost Isle				Sea plane use only.

Source: San Joaquin County Council of Governments, Regional Transportation Plan 1988 Update, September 1988.

Lodi Airpark. Lodi Airpark is located three miles south of Lodi and five miles north of Stockton on Lower Sacramento Road. Lodi Airpark is owned by an agricultural service firm and accommodates only small light aircraft. While nominally open to the public, it provides no services except to its owner's aircraft.

New Jerusalem Airport. New Jerusalem Airport is about four miles southeast of Tracy. Unlike other airports in the County, it is unattended and offers no services or facilities for based aircraft.

Agricultural Airstrips. The number of private airstrips, primarily for agricultural activities, has been increasing in recent years. The 1986 RTP Update identified as many as 30 such facilities. As urban development encroaches into agricultural areas, the potential for land use conflicts escalates. The noise, spray applications, and potential safety risks associated with these airstrips are often considered nuisances by urban neighborhoods. A real possibility is for residents of these developments to seek an abatement of the agricultural activities or to severely limit their operations.

Federal Military Airport. Sharpe Army Depot, located between French Camp and Lathrop, has an airport which regularly accommodates multi-engined propeller driven transport aircraft and smaller aircraft. It is used primarily for military cargo flights and military aircraft maintenance, as well as for Army National Guard training flights. It is open only to military aircraft.

The Federal Government has adopted a safety planning advisory document, entitled the Sharpe Army Airfield Installation Compatible Use Zone Plan (ICUZ). According to the Sharpe ICUZ a portion of the residential area around Roth Road and McKinley Avenue, in the community of French Camp, is in an Accident Potential Zone - 2 (APZ-2). The Accident Potential zones are a reference to safety hazards due to crash potential and are generally not safe for new commercial or residential construction.

Airport Land Use Planning. The California Public Utilities Code requires every county with an airport served by one or more commercial air carriers to have an Airport Land Use Commission, whose responsibility it is to formulate a comprehensive land use plan for orderly growth of the airport and surrounding area. The San Joaquin County Council of Governments is the designated Airport Land Use Commission. In assuring comprehensive and appropriate development in the airport environs, the Commission may also develop height restrictions on buildings, specify land use, and determine building standards such as soundproofing.

The COG's airport land use plans for each of the County's airports do not establish new kinds of land use designations but rely on the County's and each city's general plan and zoning ordinances. The plans identify where airport-related land uses are desirable, where residences and public assembly facilities are prohibited (in the "Inner Approach Zone"), where public assembly facilities alone are prohibited (in the "Outer Approach Zone"), and where noise levels will affect the land uses (areas of 60 CNEL and greater). The general plans of the County and the cities must be consistent with the airport land use plans. The various areas comprising the airport area of influence and the appropriate uses for each are identified in Table II.C-13. Figure II.C-3 through Figure II.C-7 show the Airport Zone boundaries and Areas of Influence which have been established for six of the public access airports in the County.

U.S. Federal Aviation Regulation Part 150 Airport Noise Compatibility Study requires airports to have noise exposure maps prepared and to identify recommendations to insure land use/noise compatibility in the airport environs. The study for the Stockton Metro Airport is expected to be complete toward the end of 1989.

8. NON-MOTORIZED TRAVEL

Bicycle Routes. The flat terrain, the many rural roads, and the relatively mild weather make San Joaquin County particularly conducive to bicycle travel. For trips of seven miles or less, the bicycle can serve as a viable alternative to the automobile. Because the bicycle is non-polluting and energy efficient, it is an element in the region's multi-modal transportation system, resulting in a more efficient transportation network.

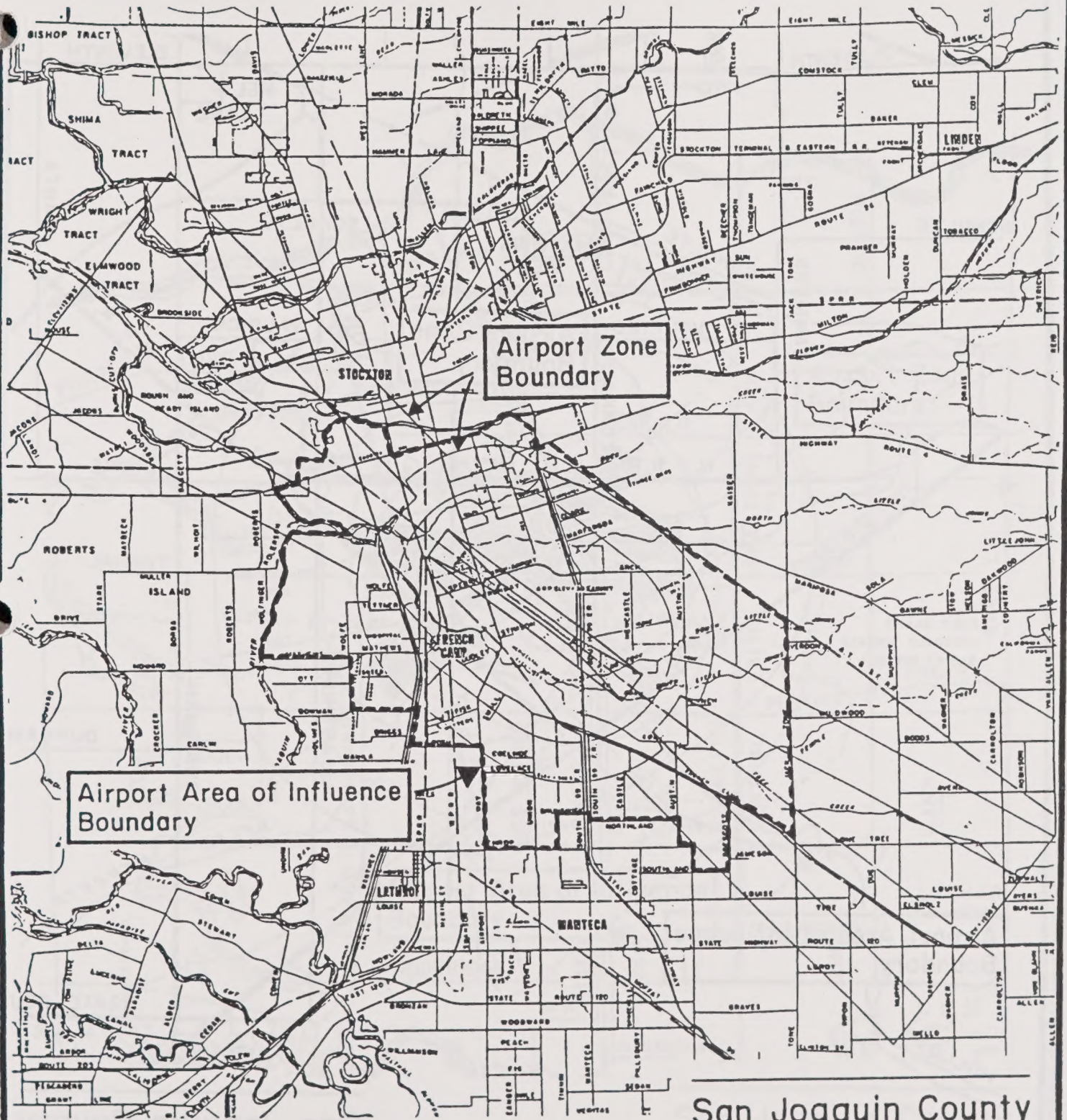
In order to make roadways safer for bicyclists, the San Joaquin County Board of Supervisors adopted the "Unincorporated San Joaquin County Bikeway Plan"(2002).

**TABLE II.C-13:
AIRPORT AREA OF INFLUENCE SUBAREAS**

Subarea	Definition	Use Guidelines
Airport Building Areas	Terminal areas, fixed base operator buildings, hangars, tiedown areas, parking areas.	Airport-related uses, compatible with high noise levels, such as airport building, hotels and motels, office, public buildings, and light industrial uses.
Other Airport Property	Airport Property not in Airport Building Areas.	Airport-related uses, compatible with high noise levels, such as airport buildings, hotels, and motels, office, public buildings, and light industrial uses.
Inner Approach and Climbout Areas	Areas under primary surfaces and under approach surfaces (within 4,000 feet of end of primary surface or 5,000 feet of end of instrument approach runway).	No use involving a high concentration of people; acceptable uses include some agriculture, open space, warehouses, and storage.
Outer Approach and Climbout Areas	Areas under approach surfaces of instrument approach runways between 5,000 and 10,000 feet of a primary surface.	No use involving a high concentration of people; acceptable uses include some agriculture, open space, warehouses and storage, residential outside of 65 db CNEL contour.
Areas Within 65 db CNEL Contours	Other than airport property and approach and climbout areas.	No noise sensitive uses or uses that present hazard to aircraft pilot.
Areas Between 60 and 65 db CNEL Contours	Other than airport property and approach and climbout areas.	Most uses, other than schools, churches, theaters, and auditoriums, if they do not present hazard to aircraft pilot.
Areas Under Horizontal and Conical Surfaces	Other than airport property, approach and climbout areas, and areas with 60 db CNEL contours.	Most uses provided they do not present hazard to pilot.
Other Lands	Areas not in any of the above but within influence boundaries.	Evaluate for tall structures and potential bird hazards. Schools must be away from flight paths.

Source: San Joaquin County Council of Governments, San Joaquin County Airport Land Use Plan, October 1983.

STOCKTON METROPOLITAN AIRPORT



San Joaquin County
General Plan

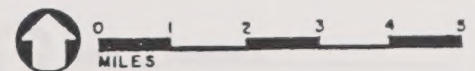
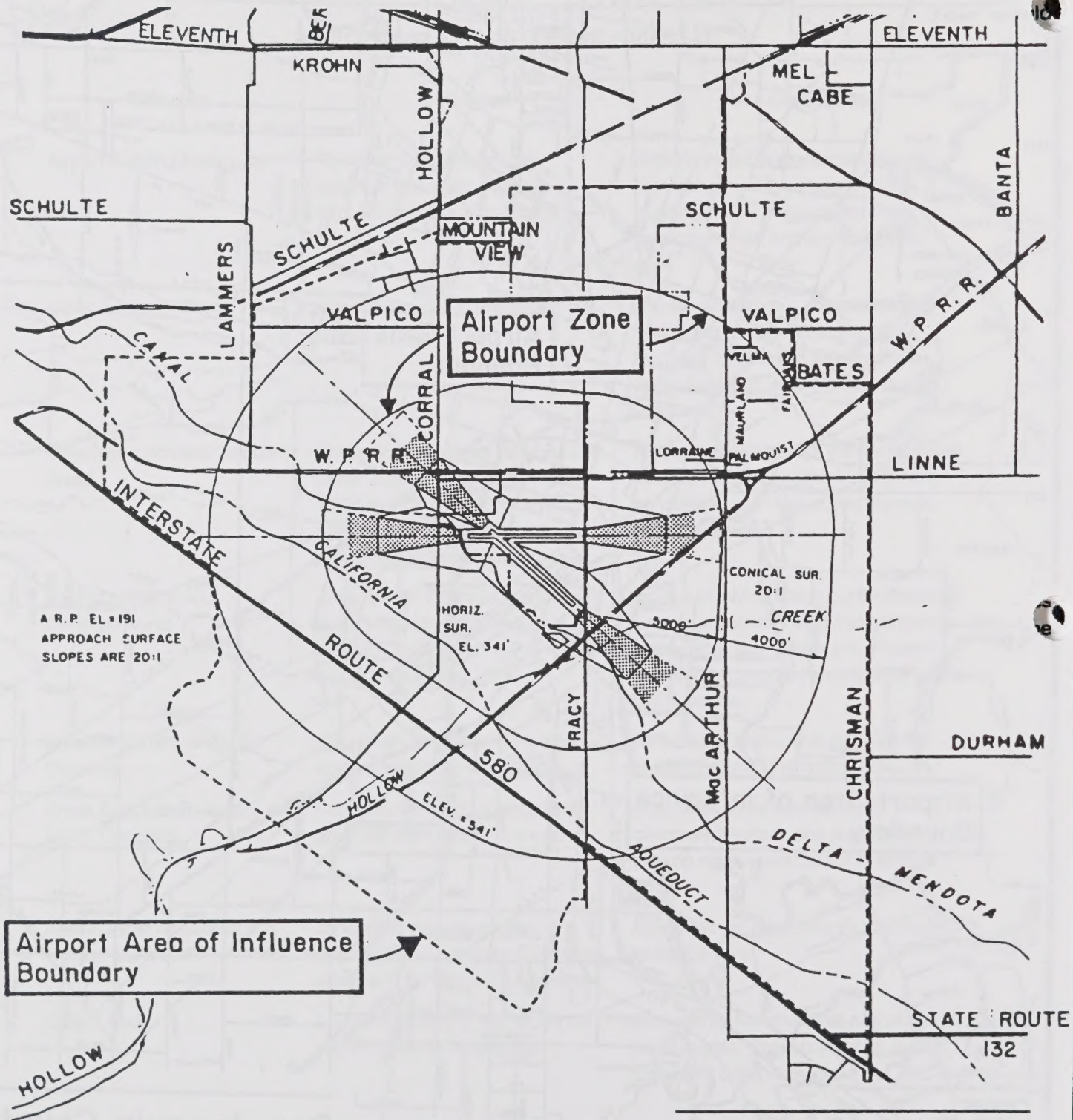


Figure II. C-3

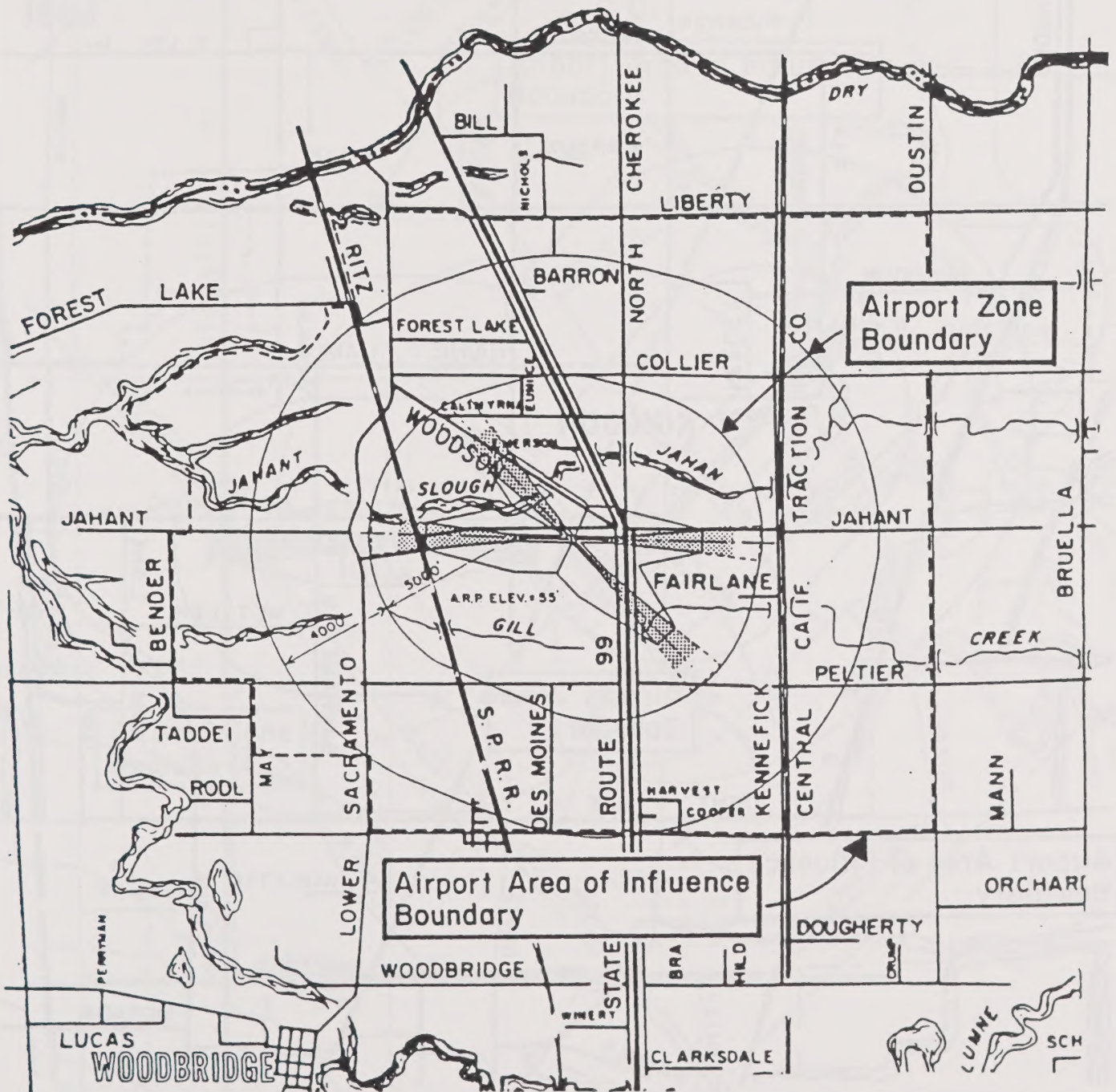
TRACY MUNICIPAL AIRPORT



San Joaquin County General Plan



LODI AIRPORT



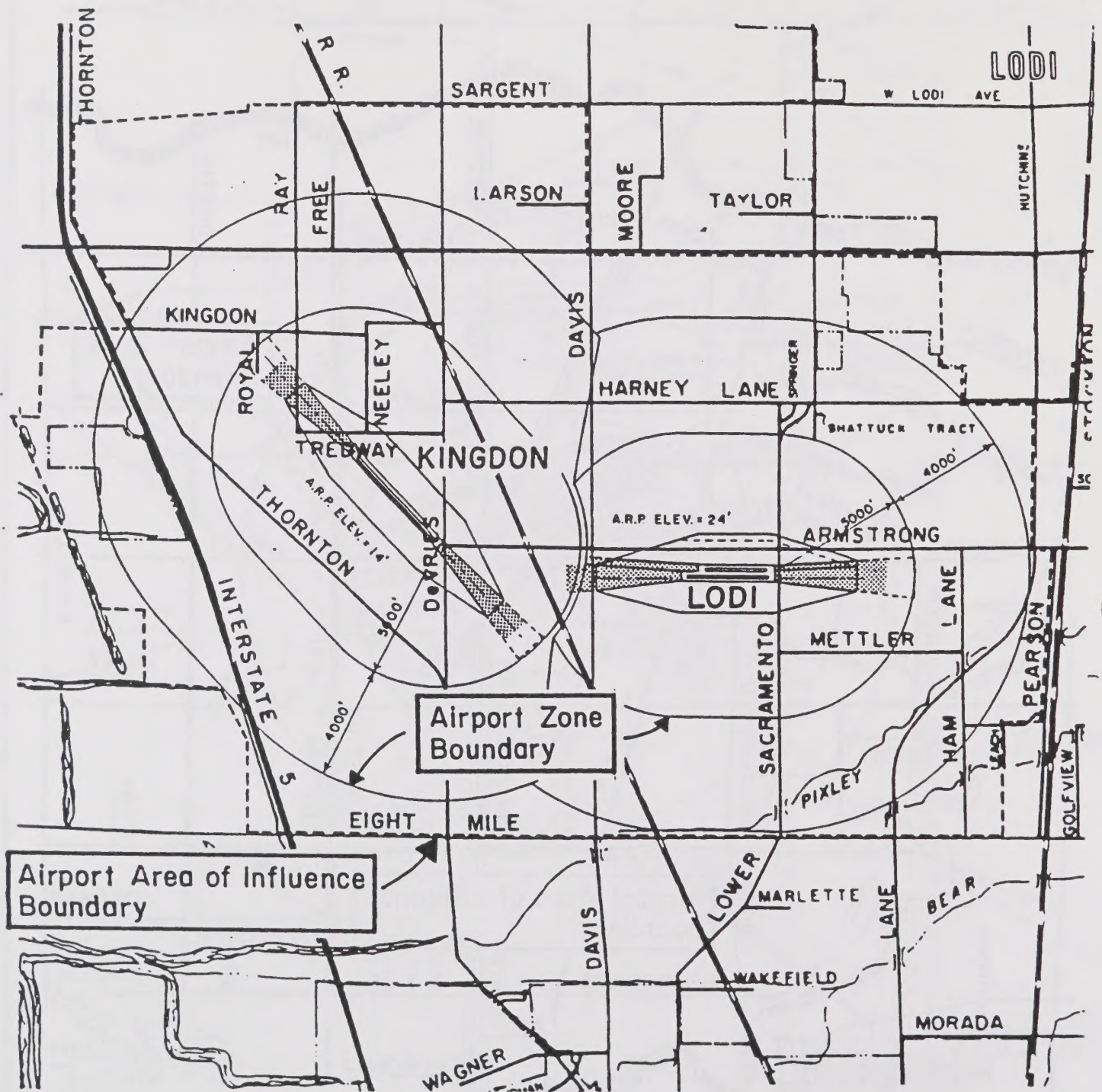
San Joaquin County
General Plan



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MILES

Figure II. C-5

KINGDON AIRPARK LODI AIRPARK

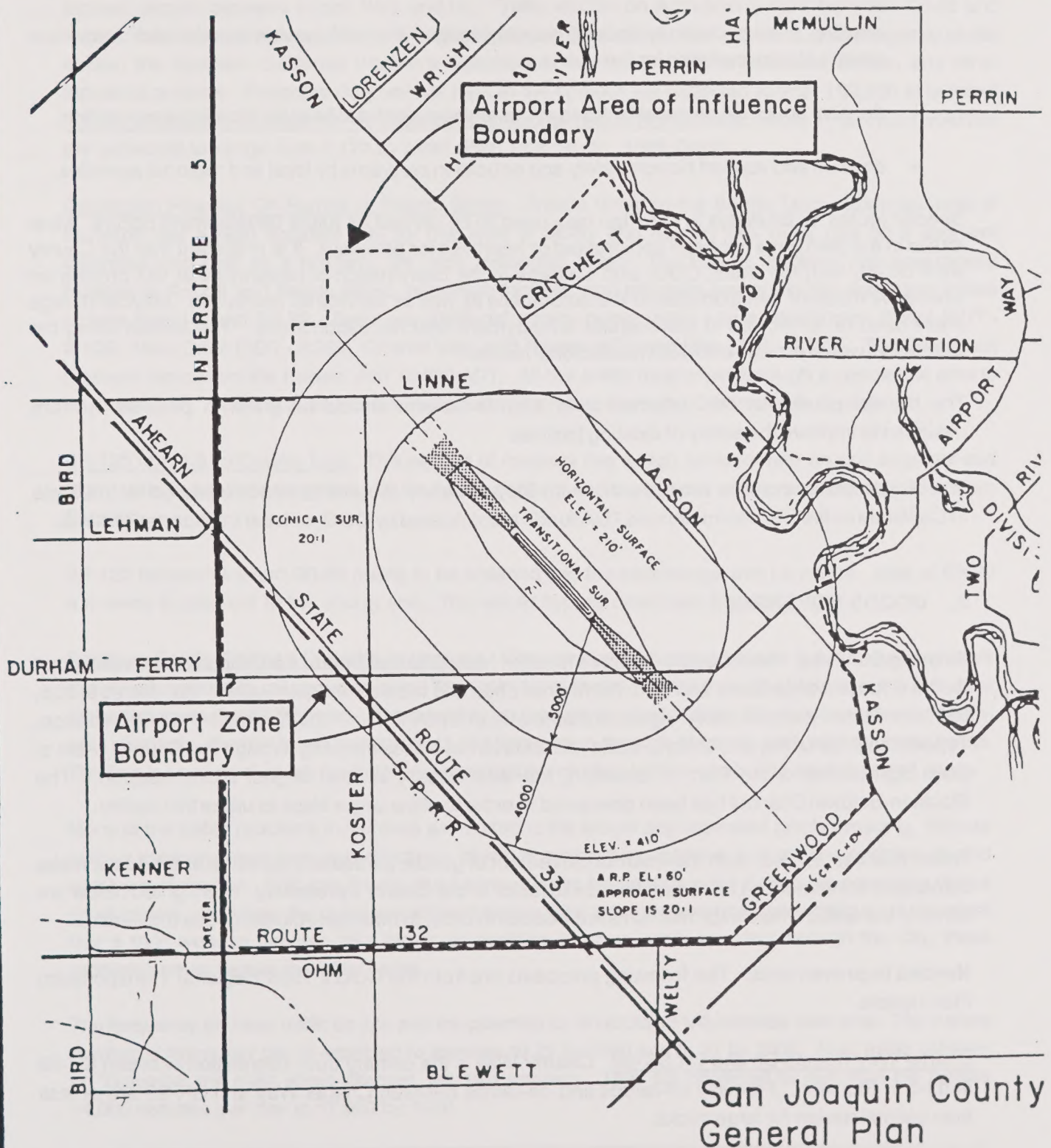


San Joaquin County
General Plan



Figure II. C-6

NEW JERUSALEM AIRPORT



San Joaquin County
General Plan



TRANSPORTATION (Cont.)

The primary goals of the Plan are to:

- develop a countywide system of bicycle facilities that will provide a safe and convenient means of transportation for the user;
- develop adequate physical facilities at the regional and local level for bicycle transportation;
- develop and support bicycle safety and education programs by local and regional agencies.

Specific routes for bikeways in the Plan may need to be revised as future development occurs. Most routes in the plan have not been constructed or improved for bikeways. It is important that the County work closely with the cities, COG, and Caltrans in the coordination of bikeways that will provide an alternative mode of transportation to the automobile as well as provide for recreation. Bicycle storage areas need to be located at commercial, employment, and recreation areas. The levees along the waterways would provide excellent recreational routes.

The highest priority for the construction of bicycle facilities should be given to projects that are designed to improve the safety of existing facilities.

The bicycle facilities can be funded either with Bicycle Lane Account Funds administered by the State of California or the 2% non-motorized TDA funds administered by COG, or local transportation funds.

9. GOODS MOVEMENT

Existing Services. San Joaquin County's location has historically made it an important terminal point for the shipment of goods to and from the Mother Lode and the San Joaquin Valley. Interstates 5, 205, 580 and State Route 99 carry significant amounts of truck traffic. The Southern Pacific; Atchison, Topeka, and Santa Fe; and Union Pacific railroads all have lines traveling through the County. Also of great significance is the Port of Stockton, the west coast's second largest inland seaport. The Stockton-Baldwin Channel has been deepened in order to allow larger ships to utilize this facility.

These facilities, teamed with the internal movement of goods, particularly agricultural products, make commodity movement an important economic factor to the County's prosperity. Highlighted below are some of the areas where improvements are needed in order to maintain efficient goods movement.

Needed Improvements. The following proposals are from the COG's 1988 Regional Transportation Plan Update.

Charter Way Ramps On and Off SR-99. Charter Way is the primary truck connection between SR-99 and I-5 in Stockton. Freeway off-ramps and on-ramps between Charter Way and SR-99 are of less than optimal design for large trucks.

Arch-Sperry Corridor from SR-99 to I-5. The Stockton area has a lack of effective east-west corridors between SR-99 and I-5. The Arch-Sperry corridor is not useful at this time for heavy truck traffic due to indirect access between Airport Way and I-5. Traffic volume on Arch-Sperry road between SR-99 and Airport Way is presently very low but is beginning to see greater volumes as a result of the regional postal center, the Northern California Women's Correctional Facility, the Airport Business Center, and other industrial projects. Projected daily vehicle trips in the corridor are expected to total 129,700 at buildout (Traffic Circulation Analysis for the Stockton Metropolitan Airport Area, June, 1984). Peak hour volumes are expected to range from 6,170 to 7,980 (Plan Line Study - 1986 Draft).

Crosstown Freeway Off-Ramps at Fresno Street. Fresno Street in the Boggs Tract residential area of Stockton has a high accident rate for that type of facility and has an 14% truck rate on a segment designed and built as a two-lane, 24' wide residential street. The Port of Stockton, the government facilities at Rough and Ready Island, petroleum facilities, and industrial tenants in the area have limited access from I-5 and SR-99. There are additional access points under I-5 via Washington Street (ADT - 3,100), Navy Drive (ADT - 3,250), Charter Way, and Fresno at Charter Way (ADT - 2,680). The Crosstown Freeway ramps are the busiest with 13,000 ADT. All this traffic must travel through a residential area to its destination. The traffic counts are expected to increase when the Crosstown is completed.

SR-120 from I-5 to County Line. This section of roadway has a high accident rate on one segment and high traffic volumes throughout. Of particular concern is the segment which runs through downtown Escalon.

SR-120 between I-5 and SR-99 needs to be widened and the interchange with I-5 rebuilt. East of SR-99 a freeway is planned to the county line. This would bypass downtown Escalon.

Southern Pacific Railroad Crossing in Manteca. Commodity movement problems in Manteca are almost exclusively related to rail transportation. The main set of tracks running through Manteca is the East Line of the Southern Pacific Railroad. These tracks run through the center of the City in a northwest to south-east direction. Currently, an average of 15 to 18 trains run through Manteca each day on these tracks. The line is used exclusively for freight transportation including lumber, grain and containerized cargo.

Many of the traffic problems in Manteca are related to the lack of any separated grade crossing. Without such a crossing, one train can effectively block all major thoroughfares in both the north/south and east/west directions. This can in turn cause serious traffic congestion in the downtown area, long delays on all streets, and make the quick and efficient passage by emergency vehicles very difficult. In the event that a train were to become disabled or an accident to occur, while traveling through the City, these problems could persist for many hours.

The frequency of these traffic tie ups and the potential for an accident will increase over time. The current number of trains per day is expected to increase to 21 by 1990 and to 31 by 2005. Auto traffic volumes on Yosemite, the main street affected, will also increase. They are projected to rise from the current 14,000 vehicles per day to 17,000 by 1990.

Southern Pacific Railroad Crossings in Tracy. The City of Tracy has built up around the junction of two lines of the Southern Pacific Railroad. These two lines, the Lathrop-Tracy and the Tracy-Martinez, both run in diagonal directions and meet very near to the center of town. As the population in Tracy has grown and traffic has increased, this rail movement has created a number of traffic problems.

The problems in Tracy are caused by an inadequate number of separated grade crossings. Currently, Tracy has only one on East Eleventh Street at the Lathrop-Tracy line. When trains move through town, long delays and traffic congestion are experienced on all major thoroughfares. In addition, this presents a potential threat to the public safety as these delays and tie-ups can prevent emergency vehicles from reaching their destinations in the shortest time possible.

The current situation is becoming increasingly severe over time due to increases in train traffic and population growth. Currently, approximately eight trains per day run through Tracy. By 1990 this is expected to jump to 34 and to increase again to 52 by 2005. This increase in train traffic will cause the number of cars delayed by trains to increase dramatically. On the three above-mentioned streets, 376 cars per day are delayed by trains. By 1995, this number will increase to 3,330. This number could be even higher depending on crew change locations.

The rapid population growth which is expected in Tracy will have a significant effect on traffic volumes as well. Current traffic volumes on Tracy Boulevard and Eleventh Street are 12,200 and 12,500, respectively. These are expected to increase to 20,500 and 16,200 by 1990, and to 30,000 and 29,000 by 2005. In addition, the majority of Tracy's population growth will be to the southwest. This area will be the least accessible to emergency vehicles if a train has Tracy Boulevard and Eleventh Street blocked. Close to 8,000 units are already planned for residential developments in this area.

MacArthur Street in Tracy - Grant Line to Eleventh. The City of Tracy currently lacks a direct truck route between I-205 and the City's eastern industrial areas. MacArthur Drive ends at Grant Line Road while many industrial facilities are located south of Grant Line. Trucks exiting I-205 heading for these areas use Eleventh Street through the center of town to reach their destinations. This is a problem for truckers because the route is much more difficult to navigate than would be a straight road exiting from I-205. This truck traffic also increases congestion downtown and makes passenger car driving more difficult. A study in 1981 counted the traffic on Eleventh Street as being 20% trucks. This will become more of a problem as residential development expands west of Corral Hollow around Eleventh Street and as industrial development takes place in the east.

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D. UTILITIES

1. WASTEWATER TREATMENT AND DISPOSAL

Wastewater Treatment Systems. The collection, treatment, and disposal of wastewater in San Joaquin County occurs primarily in two ways: community collection and treatment systems with discharge into various rivers, watercourses, and the Delta, and individual on-site treatment systems with discharge to the ground.

Septic Tank. Septic tanks are on-site systems that receive wastewater, allow heavier solids to settle in a tank, and release the remainder of the effluent a leach fields. The leach fields consist of perforated lines through which the wastewater percolates into the soil. The remaining solids must be periodically pumped from the tank and disposed.

Septic tank systems work well at low densities (minimum one acre lots), where adequate soil conditions exist, enough room can be provided for leach fields, and sufficient distance can be maintained between leach fields and potable water wells. Septic tank systems are relatively inexpensive to maintain and operate and can provide for water recharge in areas with proper soil/geologic conditions. Without proper soil, topography, geological subsurface, and water table conditions, leach fields can become saturated and groundwater can become contaminated.

Commercial and industrial uses served by septic tanks can also be problematic, because chemicals and greases used in commercial and industrial processes cannot be adequately filtered in septic systems. Thus, in some cases, chlorine injection or evaporation ponds must be provided for industrial uses. However, there may be some instances where a septic tank may be appropriate for an industrial use. For example, some warehouse uses which only generate employee waste might safely utilize a septic tank.

The septic tank system is the major means of on-site wastewater disposal in rural areas and in a few older, urbanized areas of San Joaquin County. Many of the older systems in urban areas have not had the capacity to deal with the large amounts of water used in modern day appliances. These systems are being replaced with connections to wastewater treatment plants.

Package Treatment Plants. A second form of on-site wastewater treatment is provided by package treatment plants. These facilities can serve a large area such as an entire city and its unincorporated fringe area, or it may serve only an individual development such as an industrial plant or a cluster of commercial uses. Package treatment plants are so called because they are prefabricated off site, either entirely or in modules. Package plants use aeration to speed up bacterial breakdown of organic material and produce a better quality effluent than septic systems. Although more effective than septic tanks, they are more expensive to operate and maintain. Owners must closely monitor package systems to prevent mechanical or electrical failures and to ensure stable operations.

Some package treatment plants in San Joaquin County have had problems. The most common problems are insufficient ponding area for the effluent, and inadequate operation or maintenance. Because of

economies of scale, the larger plants have personnel on duty 24 hours to identify any operational problems before they become critical.

The number of small package treatment plants being used for the treatment of industrial wastewater in the county is uncertain. The State Regional Water Quality Control Board issues discharge permits for those industries which might cause groundwater or stream pollution with their wastewater. As of January 1986, the State had issued approximately 48 permits to industrial dischargers. These permits contain wastewater standards which must be met before the wastewater is discharged. However, not all of the industries for which permits were issued have treatment plants. In some cases the standards can be met by septic systems.

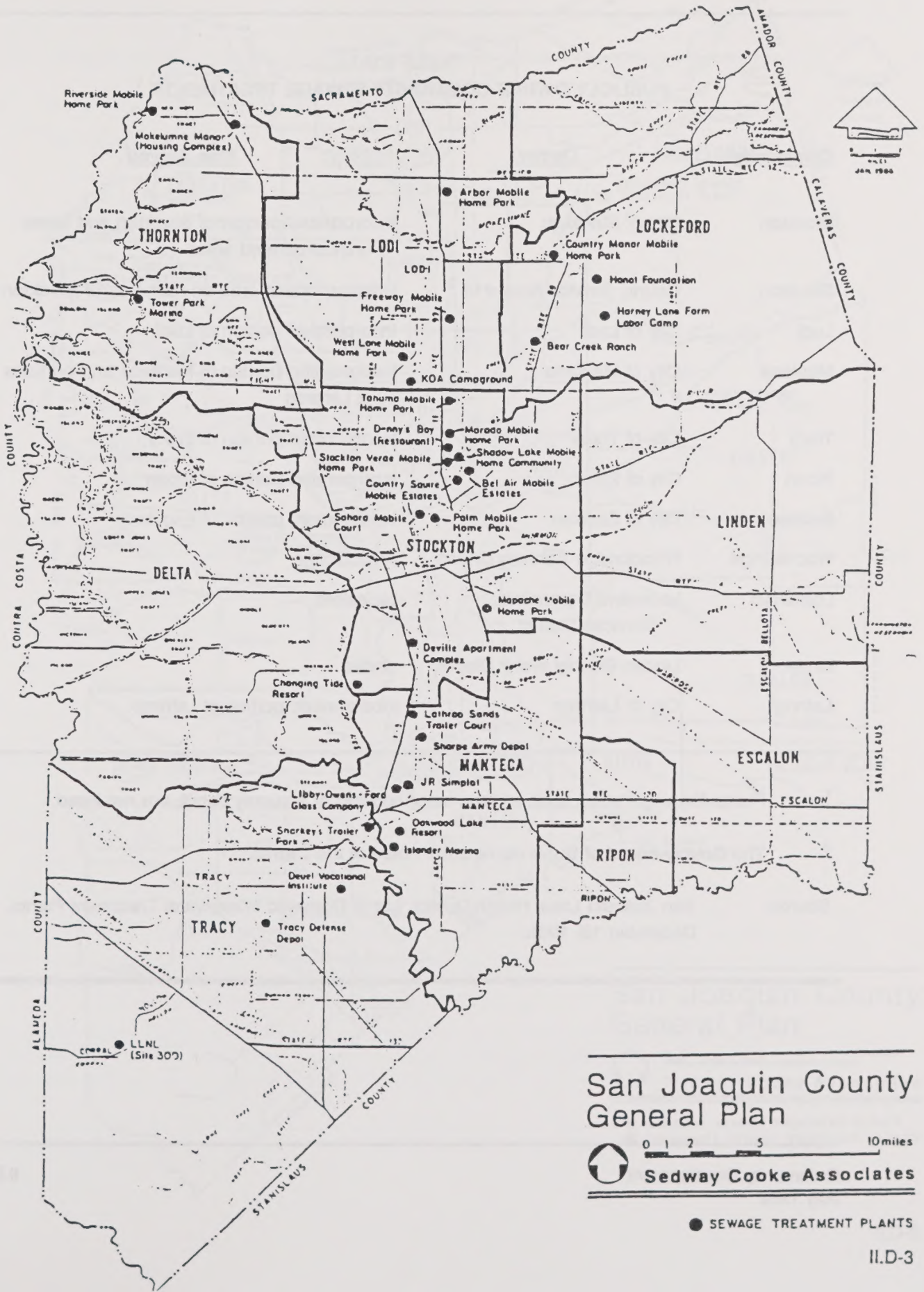
Package plants are most effective for industrial and commercial uses not served by public utility systems. Their use in new residential developments or new development adjacent to existing public systems should not be encouraged.

Community Treatment Plants. These facilities are large public wastewater treatment plants consisting of a network of collection lines, a treatment facility, and a disposal system. The system relies on a combination of physical, biological, and chemical processes to make wastes innocuous, inoffensive, and non-polluting. Effluents are typically discharged into rivers, the Delta, or other surface watercourses. Other methods of wastewater disposal include land application and the use of percolation ponds. Several large agricultural industries use land application of treated effluents during peak harvest seasons. Wastewater treatment plants with collection systems are commonly used for wastewater disposal in most urban areas.

There are nine community collection and treatment systems in San Joaquin County. They include the cities of Stockton, Tracy, Lodi, Manteca, Ripon, and Escalon; the Woodbridge Sanitary District; the Lockeford Community Services District; and the Linden County Water District. A summary of the publicly owned community treatment plants is presented in Figure II.D-1 and Table II.D-1. Numerous smaller treatment plants for domestic wastewater serve individual developments, as shown in Figure II.D-2 and Table II.D-2.

Wastewater Generation. Wastewater flow varies depending on the type and intensity of land uses. In addition, wastewater flows vary significantly from wet to dry weather periods as a result of differences in rainfall and agricultural production. A portion of this increase in flow is due to inflow and infiltration. Inflow is related to precipitation entering a system through roof and floor drains, flooded manhole covers, and storm drain catch basins connected to the sanitary collection systems. Infiltration is additional flow that enters a system through deteriorating pipes and varying groundwater levels. Significant infiltration and inflow can reduce the efficiency and capacity of both wastewater collection and treatment systems. In San Joaquin County only a few older areas in Stockton have inflow problems. Most wastewater districts have systematic programs for upgrading, replacement, and repair of old collection systems. The City of Stockton is now completing a major trunk line project to increase the capacity of the collection system incorporating older areas on septic tanks.

Figure II.D-1 CITY & SPECIAL DISTRICT SEWAGE
TREATMENT PLANTS IN SAN JOAQUIN COUNTY



**TABLE II.D-1:
PUBLICLY OWNED COMMUNITY SEWAGE TREATMENTS ¹**

<u>Community</u>	<u>Owner</u>	<u>Area Served</u>
Stockton	City of Stockton	Incorporated portion of Stockton and some unincorporated areas
Stockton	County Service Area #15 ²	Unincorporated area on east side of Stockton
Lodi	City of Lodi	Incorporated portion of Lodi
Manteca	City of Manteca	Incorporated portion of Manteca and portions of Lathrop
Tracy	City of Tracy	Incorporated portion of Tracy
Ripon	City of Ripon	Incorporated portion of Ripon
Escalon	City of Escalon	Incorporated portion of Escalon
Woodbridge	Woodbridge Sanitary District	Woodbridge
Lockeford	Lockeford Community Services District	Lockeford
Linden	Linden County Water District	Linden
Lathrop	City of Lathrop	Incorporated portion of Lathrop

¹ Plants for single uses, such as farm labor housing or a supply depot, are not listed.

² The County Board of Supervisors is the board of the District.

Source: San Joaquin Local Health District, List of Domestic Wastewater Treatment Plants, December 19, 1985.

Figure II.D-2 SEWAGE TREATMENT PLANTS FOR INDIVIDUAL, NON-INDUSTRIAL DEVELOPMENT IN SAN JOAQUIN COUNTY

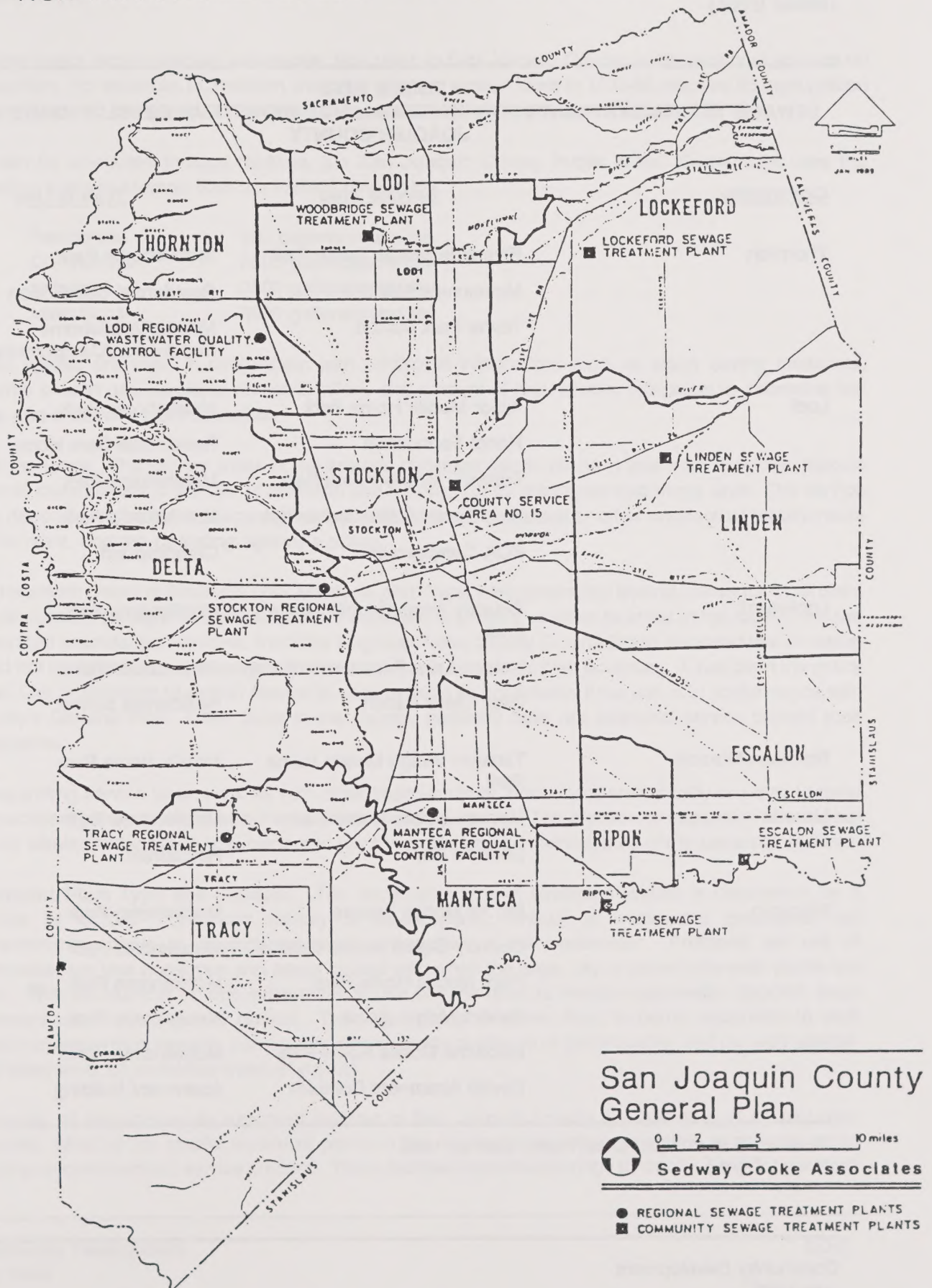


TABLE II.D-2
SEWAGE TREATMENT PLANTS FOR INDIVIDUAL, NON-INDUSTRIAL DEVELOPMENTS IN SAN JOAQUIN COUNTY

<u>Community</u>	<u>Service Area</u>	<u>Type of Use</u>
Thornton	Riverside Mobile Home Park	Mobilehome Park
	Mokelumne Manor	Residential Subdivision
	Tower Park Marina	Marina/Mobilehome Subdivision/Campground
Lodi	Arbor Mobile Home Park	Mobilehome Park
	Hanot Foundation	Residential Care Home
	Freeway Mobile Home Park	Mobilehome Park
	West Lane Mobile Home Park	Mobilehome Park
	KOA Campground	Campground
Lockeford	Country manor Mobile Home Park	Mobilehome Park
	Harney Lane Farm Labor Camp	Farm Labor Camp
	Bear Creek Ranch	Residential School
Stockton/Morada	Tahama Village Mobile Home Park	Mobile Home Park
Morada	Morada Mobile Home Park	Mobilehome Park
	Denny's Boy	Restaurant
Stockton	Bel Air Mobile Estates	Mobilehome Park
	Country Squire Mobile Estates	Mobilehome Park
	Palm Mobile Home Park	Mobilehome Park
	Sahara Mobile Court	Mobilehome Park
	Mapache Mobile Home Park	Mobilehome Park
	Deville Apartment Complex	Apartment Building

Source: San Joaquin Local Health District, 1985

Another major factor affecting wastewater flow rates in San Joaquin County is the seasonal agricultural production. For example, in Stockton, the peak canning season flows in 1985-86 reached 66 mgd (million gallons per day) compared to the average dry weather flows for the same period of 29 mgd.

To plan for adequate sewage facilities, the San Joaquin County Public Works Department uses the following average sewage flows for various land uses:

Residential	100 gallons/capita/day
Commercial	2500 gallons/acre/day
Industrial	3500 gallons/acre/day
Institutional	3500 gallons/acre/day

These figures are used in conjunction with additional information, such as water saving measures, patterns of land use, seasonal demand, inflow, and amount of groundwater infiltration to determine line sizes and treatment plant capacities.

Service Areas. The service areas of the sewage treatment plants range in size from individual parcels to small communities to the City of Stockton and a portion of its unincorporated fringe area. The service area depends on the plant's capacity, its expansion capability, federal or other contractual requirements on the plant, and the operating agency's policy.

The treatment plants of Stockton, Lodi, Manteca, and Tracy, having received federal money for expansion, are designated as regional facilities and are expected to provide services to areas in the region, not just within their boundaries. However, the State Regional Water Quality Control Board has ruled that Stockton could not be forced to extend service to an area outside its general plan boundary. It has been the policy of the City of Stockton to extend service to uses outside its boundaries if the use is in conformance with the city's General Plan. Other cities in the county, generally have not extended service beyond their boundaries.

In expanding service to an area, as with other improvements, developers are typically required to build the necessary lines and dedicate them to the operating agency. The creation or expansion of a special district allows for the future land owners to pay for operation and maintenance of the sewerage facilities.

Treatment Plant Type and Capacity. The acceptable type of sewerage system is determined by a number of factors: type and density of development, amount of wastewater generated, soil characteristics, depth to groundwater, and composition of the wastewater. Problems per unit of wastewater are less numerous and easier to deal with when the large, city or community-wide plants are used. With the number of toxic substances in use and the need to monitor wastewater disposal, large treatment plants allow greater control. The larger plants are more likely to permit expansion to treat additional amounts of sewage, can be improved to produce effluent of better quality, and can add specialized treatments for individual types of wastes.

Presently, all the community treatment facilities in San Joaquin County are operating at or very near capacity. Most of the smaller treatment plants in the county are or will be operating at capacity when existing commitments for service are filled. These facilities serve Woodbridge (capacity .5 mgd), Locketford

(capacity .3 mgd), and Linden (capacity .72 mgd). Most of the cities will need additional wastewater capacity in their plants in order to serve all the areas which are designated for development in their general plans. Future growth throughout the county will depend on the ability to obtain additional facilities, both wastewater collection and wastewater treatment systems. Several unincorporated communities currently rely on on-site disposal systems; however, concerns over groundwater contamination from system failures suggest these areas should also be served by treatment plants. French Camp and Thornton, in particular, have urban sized lots that are too small to be adequately served by septic systems.

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2. WATER SUPPLY

Water Sources. The location and availability of water resources for domestic and agricultural uses have important implications for the future type, intensity/density, and location of land uses in San Joaquin County. The county's water supply is obtained from three major sources: the Eastern San Joaquin County Groundwater Basin, surface water flows, and the Delta.

Groundwater. The Eastern San Joaquin County Groundwater Basin is the primary source of potable domestic water in the county. The boundaries of the groundwater basin extend from the San Joaquin-Sacramento County line and Dry Creek in the north to the Stanislaus River on the south; and from the San Joaquin River and eastern edge of the Delta on the west to approximately the San Joaquin County line on the east.

Groundwater for domestic consumption has been the preferred water source because the cost of good quality, fresh groundwater is substantially less than the cost of importing treated surface water. Groundwater generally requires little treatment, whereas surface water must be filtered and treated for domestic use. In addition, it is much less costly to locate wells near the end users with short transmission lines than to transport water a longer distance through larger more capital intensive systems.

Groundwater is a renewable natural resource located beneath the earth's surface in water-transmitting geologic formations called aquifers. A groundwater basin can be replenished again and again either naturally by rainfall, snowmelt and surface runoff, or it can be replaced artificially through groundwater recharge. In San Joaquin County, the primary means of obtaining groundwater is pumping from wells.

Extraction of groundwater in San Joaquin County has exceeded the rate of replenishment since the 1920s. By the mid 1960s the average groundwater extraction was over 750,000 AF (acre-feet) per year, with an average overdraft of about 73,000 AF annually. Overdrafting in the past few decades has caused a steady decline in groundwater levels in San Joaquin County creating a zone of depression in western San Joaquin County areas and allowing the intrusion of highly saline Delta water into the groundwater basin. Wells near the Delta, in far western San Joaquin County, have been abandoned in some cases due to the saline intrusion. Continued extensive groundwater pumping has also caused a progressively eastward movement of the saline front threatening the usability of more well sites. In 1967 the Department of Water Resources (Bulletin No. 146) concluded that poor quality groundwater was moving easterly in the Stockton area at a rate of 140 to 150 feet per year. In addition, overdrafting is associated with ground subsidence in west county areas.

Recent studies of the groundwater basin predict the average groundwater levels will fall to 160 feet below sea level by the year 2020 if water users continue to rely primarily on groundwater sources with no new surface water supplies. This decline represents an average drop of 1.8 feet per year. Further reductions in fresh groundwater levels could dramatically affect saline intrusion by drawing the saline front between 1.3 to 2.3 miles further east, which will put it in the vicinity of SR-99, and contaminating additional wells. Approximately 220,000 AF of supplemental surface water needs to be brought into the county to reduce the pumping from the groundwater basin and thereby slow down the saline intrusion. However, some saline intrusion will still occur even if the supplemental water is brought in.

Without the introduction of supplemental water supplies in the future, groundwater pumping will continue to decrease water levels in the San Joaquin Groundwater Basin. A number of proposed projects to provide areas with supplemental water will decrease groundwater pumping to safe yield levels. For example, the City of Stockton is committed to reducing its dependence on groundwater and to achieve safe yield levels. With the operation of the Stockton East Water Treatment Plant, the problems of overdrafting have improved. The plant treats Calaveras River water providing water for the east Stockton areas. Potential problems of overdrafting in the North Stockton area will be alleviated with the completion of a 48-inch pipeline connecting the city water system with the eventual expansion of the Stockton East Water Treatment Plant.

Surface Flow. The second major source of water in the county is supplied by major rivers and reservoirs. The river sources include the Mokelumne, Calaveras, Stanislaus, and San Joaquin Rivers. In addition, numerous smaller streams and creeks traverse the County and include Dry Creek, Bear Creek, Mosher Creek, Mormon Slough, Duck Creek, Littlejohns Creek, Temple Creek, and Lone Tree Creek. Many of these creeks, however, flow only part of the year. Six major surface water reservoirs are operated along the upper reaches of these rivers and tributaries, supplying water to San Joaquin County. They include the Camanche, Pardee, Farmington, Woodward, New Hogan and New Melones Reservoirs.

Surface water supply is subject to a complex federal and state legal system establishing the rights of individuals and agencies to water flows through permits, licenses, court decrees, and contracts, and federally prescribed flood control regulations.

The Delta. A third major source of water is the Delta, particularly in southwest San Joaquin County. Exporting fresh water from the Delta, however, has caused many problems. Reverse flows, declining fisheries, water quality problems, and levee erosion are among the many problems associated with water transfers from the Delta. Fresh waters from the Sacramento and San Joaquin Rivers meet and mix with the salty San Francisco Bay waters in the Carquinez Straits and the channel areas lying immediately to the east in a "hydraulic barrier." Fresh waters flowing out through the Delta to the bay prevent the intrusion of tidal salt waters into the fresh water Delta. When this outflow is reduced, through pumping and water exportation projects, salt water moves eastward into the Delta threatening wildlife habitats, fisheries, and restricting municipal, agricultural, industrial and recreational uses.

Water Services. Residents of San Joaquin County are served by over 50 separate water agencies ranging in size from just a few service connections to larger systems with thousands of service connections. Table II.D-3 is a summary of the major water service agencies in the county. In addition to these water distribution agencies, there are hundreds of smaller shared private water systems and thousands of individual wells for domestic and agricultural uses. While the primary source of water for these water service agencies and private systems are wells, many larger districts buy surface water wholesale for treatment and distribution.

The proliferation of agencies relying on groundwater has contributed to the uncoordinated use and overdrafting of the San Joaquin Groundwater Basin. Coordination between all water suppliers will be necessary to work toward providing adequate supplies of water to meet future demands.

TABLE II.D-3
SAN JOAQUIN COUNTY WATER SYSTEMS

<u>Planning Area</u>	<u>Agency</u>	<u>Comments</u>
STOCKTON		
City	California Water Service Co. City of Stockton Colonial Heights Maintenance Dist. Lincoln Village Maintenance Dist. Stockton-East Water Dist. Southern System Stockton Verde Mobile Home Park Shadow Lake Mobile Home Community Elkhorn Estates Rancho San Joaquin CSA #15 CSA #17 Cherokee Industrial Park CSA #20 Fairchild Industrial Park Walnut Acres	System at capacity, overdrafting wells in north Stockton area; new water main under construction from treatment plant to north Stockton area; additional surface water needed for future development. Expansion of treatment plant required.
French Camp	Private wells	30-40 individual wells; saltwater intrusion, nitrates, and total dissolved solids result in poor quality.
Morada	Almond Park Maintenance Dist. Wilkinson Manor Maintenance Dist. (#1, #2, A Zone) Shaded Terrace Maintenance Dist. Morada Estates Maintenance Dist. Morada Manor Maintenance Dist. Morada Acres Maintenance Dist. Gayla Manor Maintenance Dist.	10 operating wells with known productions of 3,350 gpm of good water quality (2,775 gpm with largest well out of service).
LODI		
City	City of Lodi Water	
Woodbridge	Fairview Estates CSA #18 Mokelumne Acres Maintenance Dist.	Operations 4 existing wells.
Victor	San Joaquin County Water Works Dist. #2	Operates 2 wells, rated about 1,000 gpm each; present quality appears good although past problems with DPCB's.
Acampo	Acampo Maintenance Dist.	Operates one well with one standby; nitrates and DPCB's detected; 2 new wells being installed.

**TABLE II.D-3: (Cont.)
SAN JOAQUIN COUNTY WATER SYSTEMS**

<u>Planning Area</u>	<u>Agency</u>	<u>Comments</u>
Coopers Corner	Private wells	About 100 private wells with good water quality.
Collierville	Private wells	
TRACY		
City	City of Tracy Corral Hollow Public Improvement and St. Lighting Maintenance Dist. San Joaquin River Club Currier Estates Water Corp. Par Estates CSA #16	City treats Delta Mendota water using 6,400 afa of 10,000 afa allotment; additional 6,500 afa for ultimate buildout; other districts using wells with some water quality problems.
Delta	Private wells	About 70-100 private wells; some with high nitrate concentrations.
Vernalis	Private wells	About 40-60 private wells with good water quality.
Valpico	Maurland Manor Maintenance Dist.	
MANTECA		
City	City of Manteca Raymus Village Maintenance Dist.	System needs additional wells/surface water for growth; extensive improvements required to lines and storage; water quality problems with existing wells.
LATHROP		
Lathrop	Lathrop county Water Dist.	Operates 3 wells with average production of 2,700 gpm (with largest well out of service); new well being negotiated; additional surface water/wells needed for new growth; water quality problems with wells; new storage with capacity of 450,000 gallons recently completed.
City	City of Ripon Spring Creek Estates Public Improvement and Lt. Maintenance Dist.	Deep wells at capacity; new development requires new wells.

TABLE II.D-3: (Cont.)
SAN JOAQUIN COUNTY WATER SYSTEMS

<u>Planning Area</u>	<u>Agency</u>	<u>Comments</u>
ESCALON		
City	City of Escalon	Wells
LOCKEFORD		
Lockeford	San Joaquin Co. Services Dist. #1	Operates 2 deep wells; new well planned 1988-89; new mains installed recently; smaller lines downtown must be upgraded for fire protection.
Clements	Clements Water Co. (private system)	Relies on one well; distribution system old and undersized, lacking water pressure.
LINDEN		
Linden	Linden County Water Dist.	Operates 4 deep wells with pumping capacity of 2,150 gpm; expansion requires new wells; new wells also needed for adequate fire protection.
Farmington	Farmington Water Co. (private system)	Operates 2 wells each rated at 1,000 gpm.
THORNTON		
Thornton	County Service Area #12	Operates 2 wells with production of 1,330 gpm total; water must be chemically treated; further growth should consider surface water or water from Woodbridge Irrigation District.
DELTA		
Rural area	Private systems	

Source: San Joaquin County Planning Division, 1986.

Future Demand

Municipal Water Use. Future water use projections for San Joaquin County have been developed by the U.S. Bureau of Reclamation (USBR) as part of the planning for the Folsom South Canal extension project for the years 2000 and 2020. Water use in urbanized areas is shown in Table II.D-4. Historical water data from Stockton indicates water use on the maximum day could be as great as 210 percent of the average daily demand.

**TABLE II.D-4
SELECTED WATER USE RATES IN URBANIZED AREAS**

<u>Land Use</u>	<u>Annual Water Use (Acre feet/acre)</u>
Low-Density Residential	
Planned Unit Residential Development	3.2
Non-Planned Unit Residential Development	2.4
High-Density Residential	4.2
Commercial/Professional Office	2.0
Light Industrial	1.1
General Industrial	2.5
General Industrial	2.5
Schools/Institutional	2.5
Parks	3.5

Source: Leedshill-Herkenhoff, Inc.; Update of the North Stockton Master Water Plan, Final Report, City of Stockton, March 1985; South Stockton Water Master Plan, City of Stockton, February 1985.

Agricultural Water Use. Agricultural water users in San Joaquin County include riparian rights users, agricultural users with private wells, Water Conservation Districts, and Irrigation Districts. Within the Eastern San Joaquin County Groundwater Basin (which excludes the Tracy area and the southwest portion of the county), agricultural water use in 1990 was projected at 890,600 acre-feet per year. By comparison, municipal and industrial water use for the same area was projected at 77,600 acre-feet.

Thus, agricultural water use will continue to be the dominant consumer of the county's groundwater supplies.

Future Water Sources. Treated surface water used in conjunction with groundwater in a countywide water management program is necessary to meet the long term demand for water in the region. In order to maintain the San Joaquin County Groundwater Basin at safe yield levels, future water sources must rely on treated surface water for new development. The costs of the water, including its transportation, treatment and storage, may necessitate fees for the water users. County, city, and other water agencies are reviewing a number of options for obtaining additional surface water supplies.

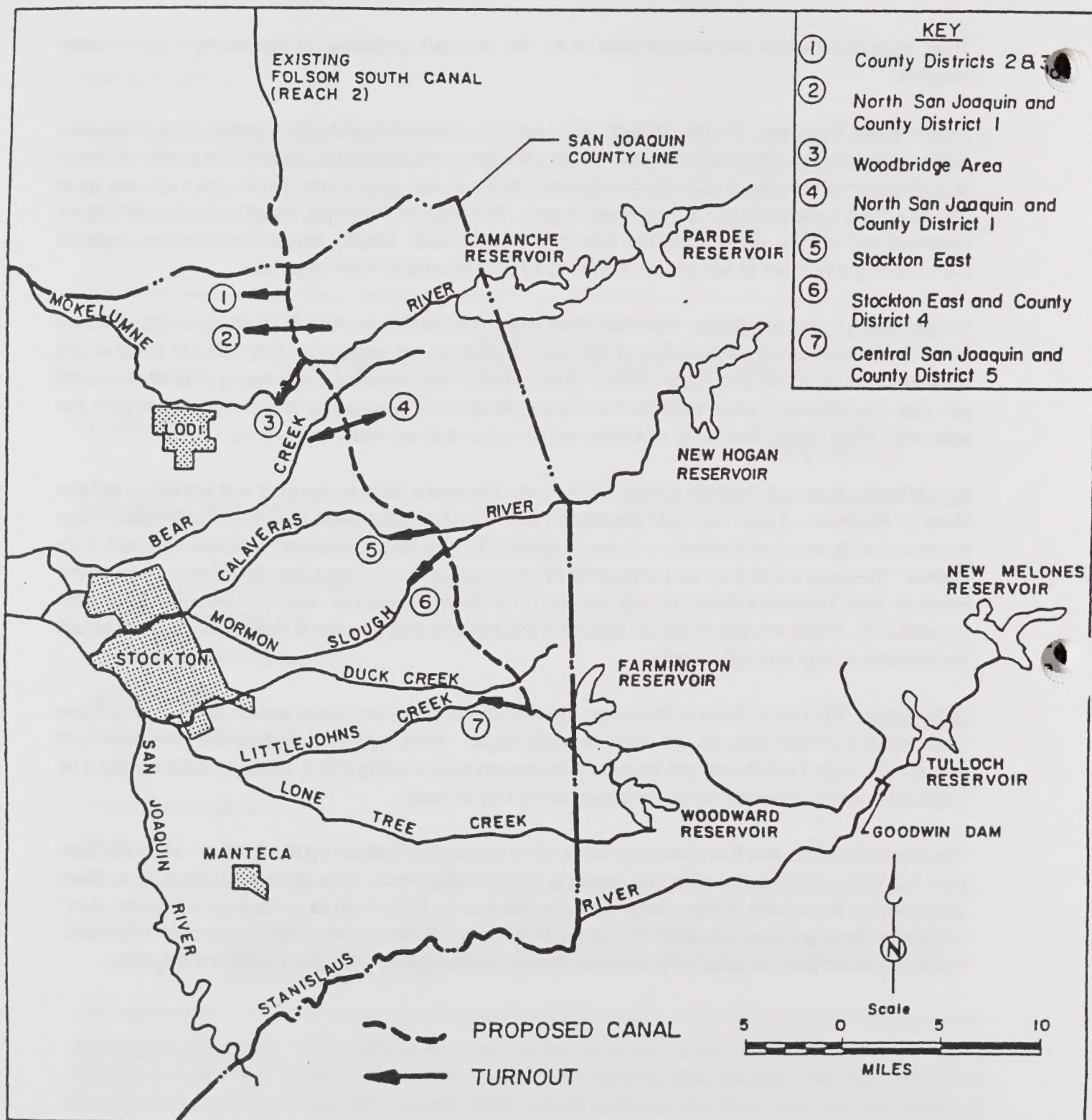
Folsom South Canal Extension. American River water is presently diverted 27 miles south from Folsom Lake. To be useable to communities in San Joaquin County, an additional 15-42 miles of canal would have to be constructed (see Figure II.D-3). This source would provide approximately 270,000 acre-feet per year of additional surface water to the county. Because of controversy and complications over the extension of the canal, availability of water from this source is uncertain at this time.

New Melones Water via Stanislaus River. Water from Stanislaus River is captured and stored in the New Melones Reservoir. A plan has been proposed that would divert Stanislaus River water at Goodwin Dam by means of a canal and tunnel to a new reservoir, Shirley Gulch Reservoir, located upstream from Bellota. The water would then be transported to communities for treatment and distribution, such as the Stockton East Treatment Plant, through canals to Farmington Reservoir, and the Calaveras River (see Figure II.D-4). Under this alternative an additional 155,000 acre-feet per year of New Melones Water would be available to San Joaquin County.

Delta Water. The City of Tracy and the agricultural districts in the southwest portion of the county have water rights from the Delta via the Delta Mendota Canal. Tracy's present contract with the Bureau of Reclamation is for 10,000 acre-feet per year from the canal but is using only 6,400 acre-feet per year. Full entitlement would support short-term growth in the City of Tracy.

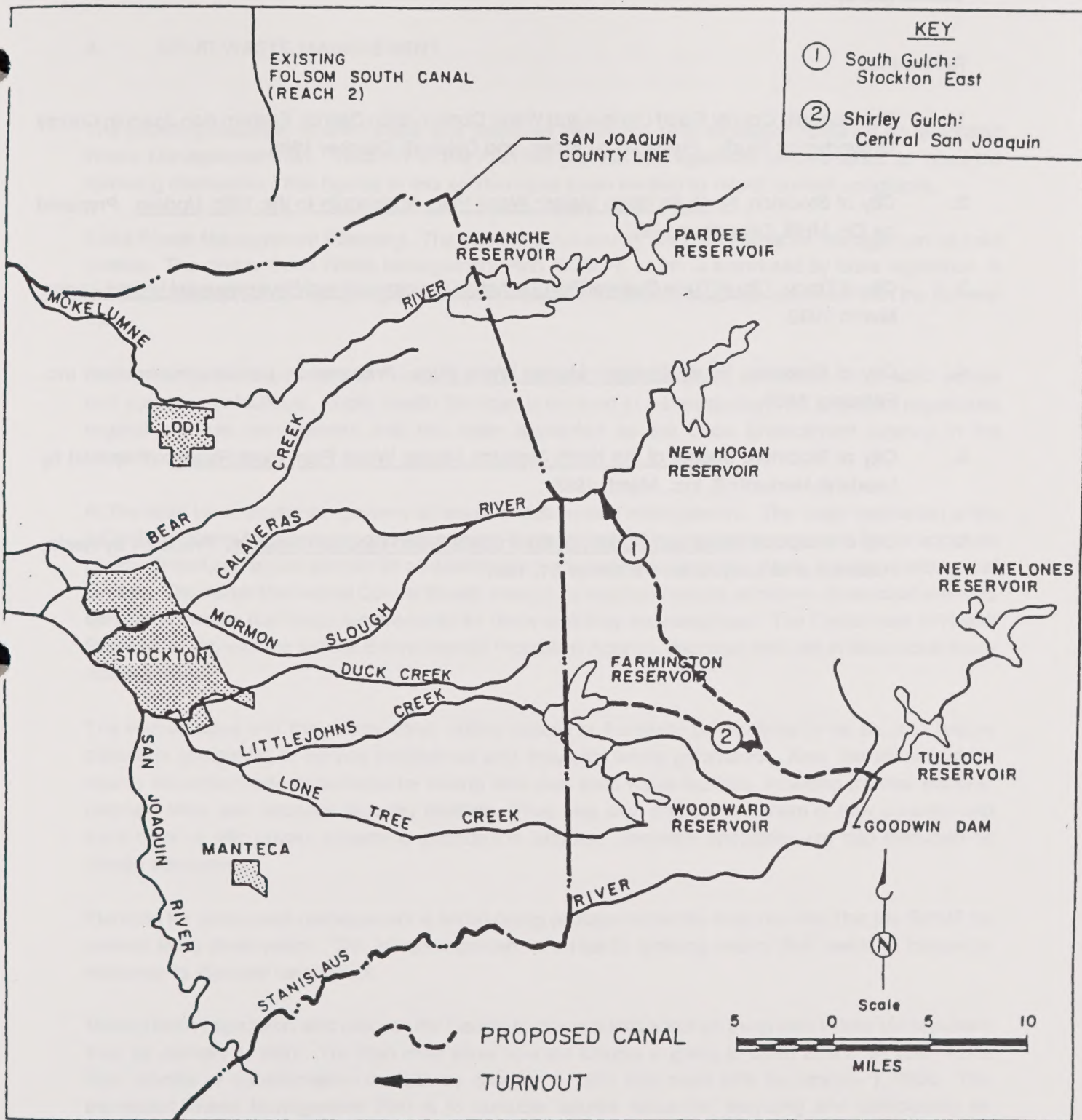
The City of Stockton also has pending a water rights application to divert up to 45,000 acre-feet per year from the Delta at a location near the terminus of Eight Mile Road. The city would divert an amount equivalent to the volume of wastewater it discharges into the Delta from its wastewater treatment plant. Preliminary findings have indicated the quality of water is suitable for domestic use through treatment. The water could also be used for delivery to farmers who presently use groundwater for irrigation.

Figure II.D-3 FOLSOM SOUTH CANAL SCHEMATIC EXTENSION



Source: Brown and Caldwell, Eastern San Joaquin County Groundwater Study,
San Joaquin County Flood Control and Water Conservation District, October 1985.

Figure II.D-4 NEW MELONES/STANISLAUS RIVER SCHEMATIC



San Joaquin County
General Plan



0 1 2 5 10 miles

Sedway Cooke Associates

Source: Brown and Caldwell, Eastern San Joaquin County Groundwater Study,
San Joaquin County Flood Control and Water Conservation District, October 1985.

References

1. San Joaquin County Flood Control and Water Conservation District, Eastern San Joaquin County Groundwater Study. Prepared by Brown and Caldwell, October 1985.
2. City of Stockton, North Stockton Master Water Plan, Addendum to the 1985 Update. Prepared by CH₂MHill, December 1987.
3. City of Tracy. City of Tracy General Plan Technical Supplement and Environmental Impact Report, March 1982.
4. City of Stockton, South Stockton Master Water Plan. Prepared by Leedshill-Herkenhoff, Inc., February 1985.
5. City of Stockton, Update of the North Stockton Master Water Plan, Final Report. Prepared by Leedshill-Herkenhoff, Inc., March 1985.
6. City of Stockton, Fiscal and Public Facilities Study, North Stockton Projects. Prepared by Recht, Hausrath and Associates, December 21, 1987.

3. SOLID WASTE MANAGEMENT

The following materials on solid waste was prepared before the 1989 legislation requiring an Integrated Waste Management Plan. Volume I of the Plan reorganizes the legislative requirements, as does the following discussion. The figures in this section have been revised to reflect current conditions.

Solid Waste Management Planning. The cities and the county are responsible for management of solid wastes. The county Solid Waste Management Plan (SWMP), which is mandated by State legislation, is the plan under which all the county jurisdictions operate.¹ This plan must be consistent with the General Plan.

In the county, the Department of Public Works is the lead department for administration of solid wastes and operation of facilities. Public Health Services is involved in administering local and state regulations regarding waste management and has been appointed as the Local Enforcement Agency in the unincorporated areas.

At the state level, legislation governs all areas of solid waste management. The major legislation is the 1972 Solid Waste Management and Resources Recovery Act.² The Waste Management Board approves county SWMP and issues permits for all facilities, including resource recovery plants, transfer stations, and landfills. The Water Resources Control Board, through its regional boards, approves all disposal sites and establishes waste discharge requirements for them until they are completed. The Department of Health Services, along with the federal Environmental Protection Agency, becomes involved in hazardous waste management.

The various cities and the county either collect wastes or franchise private firms to do so, and license collection companies to service commercial and industrial waste generators. Also, the cities and the county are individually responsible for having their own solid waste facilities, including transfer stations, disposal sites, and resource recovery facilities. They may own and operate them or may contract with each other or with private industry to provide the facilities. Recovery operations are also managed by private companies.

Planning for solid waste management is an on-going process since the state requires that the SWMP be revised every three years. This is very important in a rapidly growing county that needs to frequently reassess its disposal capabilities.

Recent State Legislation also requires the County to prepare and adopt an Integrated Waste Management Plan by January 1, 1991. The Plan must show how the County is going to divert 25% of all solid waste from landfills or transformation facilities by January 1, 1995 and divert 50% by January 1, 2000. The Integrated Waste Management Plan is to consider source reduction, recycling and composting as methods of diverting solid waste from landfills. Methods of treating and disposing the hazardous wastes generated by residents are also to be included in the Plan.

Waste Composition. The greatest volumes of wastes in the county are municipal wastes from residential and commercial/industrial sources. Accurate data on municipal waste composition in San Joaquin County is not available. In 1978 it was estimated that, in percent by weight, 47% of the wastes were paper, 35% were miscellaneous organics (yard waste, molded plastics, garbage, wood), and 18% were inerts (glass, metal, etc.).³

There are other wastes that require handling procedures different from typical residential and commercial/industrial wastes. The most common types with the methods of disposal are listed below:

- o Abandoned vehicles - recovery of portions, with landfill disposal of remainder;
- o Agricultural wastes - animal feed, on-site disposal;
- o Construction/demolition debris - recovery, with remainder disposed of at landfill or other site;
- o Food processing - land application, processing to animal feed or compost;
- o Grease trap pumpings - no legal deposit site in county; generally taken out of county;
- o Hazardous wastes - see Hazardous Materials and Wastes Technical Appendix;
- o Infectious wastes - incineration, autoclave, burial at Class II or III site;
- o Litter and recreation wastes - landfill disposal;
- o Septic tank pumpings - some wastewater treatment plants;
- o Street sweepings - city and county disposal sites;
- o Tires - some shredding and recycling as fuel, accepted at the county landfills; and
- o Wastewater treatment sludge - land application or landfill disposal.

Existing Facilities. The majority of the county's solid wastes are taken by collection agencies or individuals either directly to landfills or to transfer stations, which accumulate wastes for later transport to a landfill. For planning purposes the county has been divided into north, central, and south areas with a general-use landfill being available for each area (see Figure II.D-5).

Transfer Stations. Lovelace Transfer Station, owned and operated by San Joaquin County, serves the Central County Region and disposes of waste in the Foothill Landfill. The Lodi Transfer Station, privately

owned and operated, serves the north county and uses Harney Lane Landfill. The other four transfer stations are small and owned and operated by collection companies but primarily for their own use as reclamation facilities (see Figure II.D-6).

Disposal Sites. Figure II.D-7 and Table II.D-5 identify existing disposal sites and describe their operating characteristics. In addition, a landfill in Sacramento County serves a small portion of northern San Joaquin County, and a landfill in Stanislaus County serves Escalon and some industrial customers in the south county.

Disposal sites are classified under the State Administrative Code according to the types of wastes they are permitted to receive. The majority of sites in the county have been Class II-2 (nonhazardous solids and inert materials accepted) or Class III (inert materials). Forward, Inc. Landfill had a Class II-1 designation, which means that it can accept certain hazardous wastes, designated liquids and sludges as well as solid wastes. It may not accept putrescibles and is no longer accepting hazardous wastes. There are no Class I sites in the county, i.e., sites which may accept almost all hazardous wastes. The classification system has recently changed, and after review by the State Waste Management Board, most II-1 sites probably will be reclassified to II, most II-2 sites to III and most III sites will become unclassified.

Future Needs.

Waste Generation Projections. At the present time total waste generation, based on population, is thought to be 6 to 7.5 lbs/capita/day.⁴ More complete data than presently available is needed to improve estimates of total waste generation. Based on recent history, no increase in the number of pounds per capita is expected. In fact, between 1979 and 1984 the amounts of waste decreased. This decrease may be due to increased reclamation and to Forward, Inc.'s decision to no longer accept hazardous wastes.

The 1986 SWMP estimated that three major landfills will reach capacity before 2005. In order of need for replacement or expansion the landfills are Corral Hollow, Harney Lane and Austin Road. There are no capacity problems at Forward, Inc. or Foothill.

Siting of Facilities. Before a solid waste facility is approved, it must be found to be consistent with the General Plan. All facilities should be compatible with adjacent existing or planned land uses.

Of the various types of facilities, landfills are the most difficult to site. Because of their characteristics they will be located outside of urban areas and a thorough environmental assessment will be needed for each site. Some potential impacts and possible mitigation measures are presented in Table II.D-6.

Transfer stations also have the potential for many impacts and should be regulated with a use permit. Other types of facilities may require a conditional permit depending on their characteristics and the zone in which they are to be located. Waste-to-energy facilities, incinerators, composting, and waste processing facilities established for the primary purpose of recovering recyclable materials are most appropriate in areas designated Industrial, but may be located in areas designated agriculture in the General Plan if the zoning permits. Collection sites for reusable and recyclable materials would be considered in commercial areas as well as in industrial and agricultural areas.

Figure II.D -5 REFUSE SERVICE AREAS

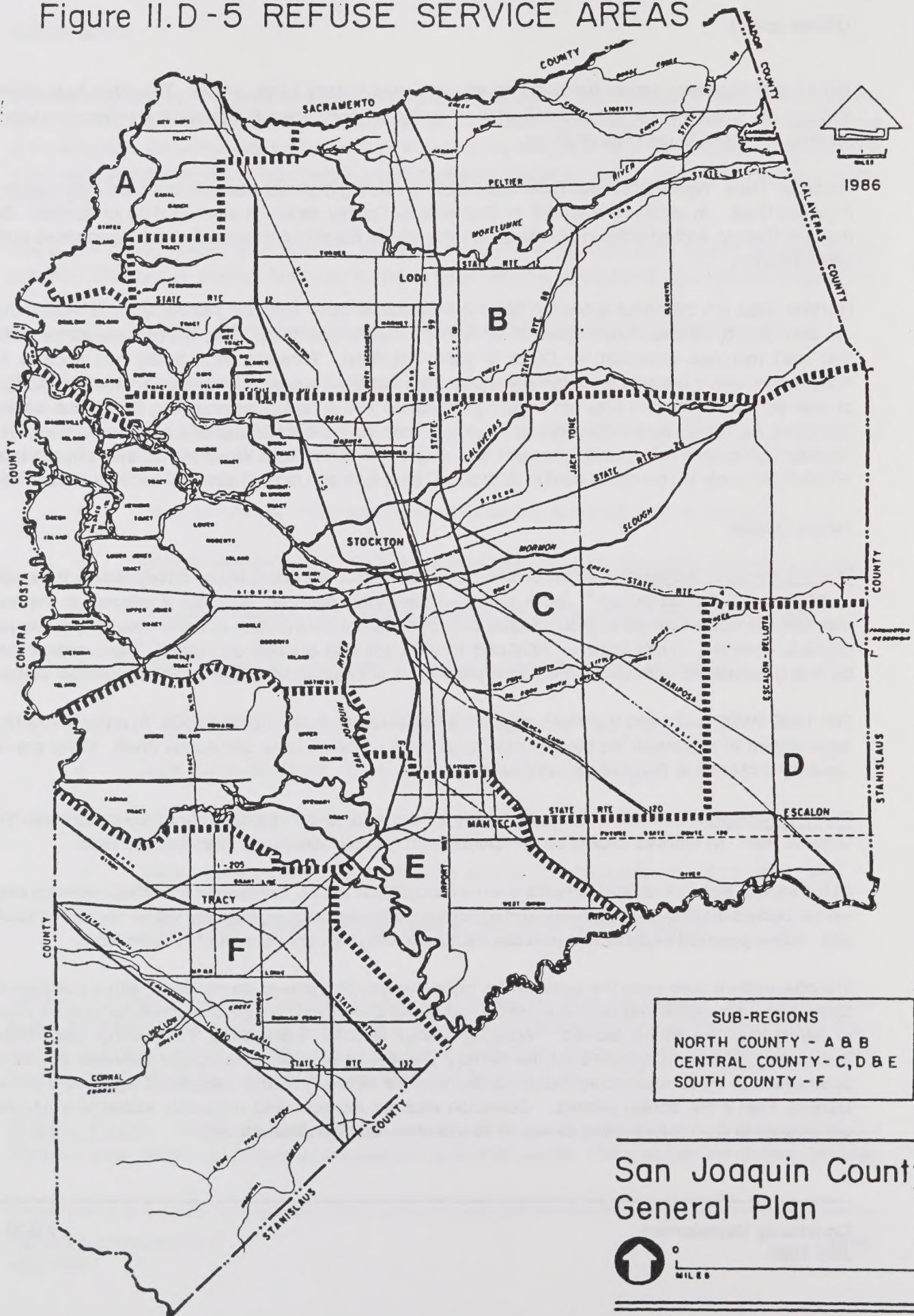


Figure II. D-6

LOCATION OF TRANSFER STATIONS & PRINCIPAL RECYCLING AREAS

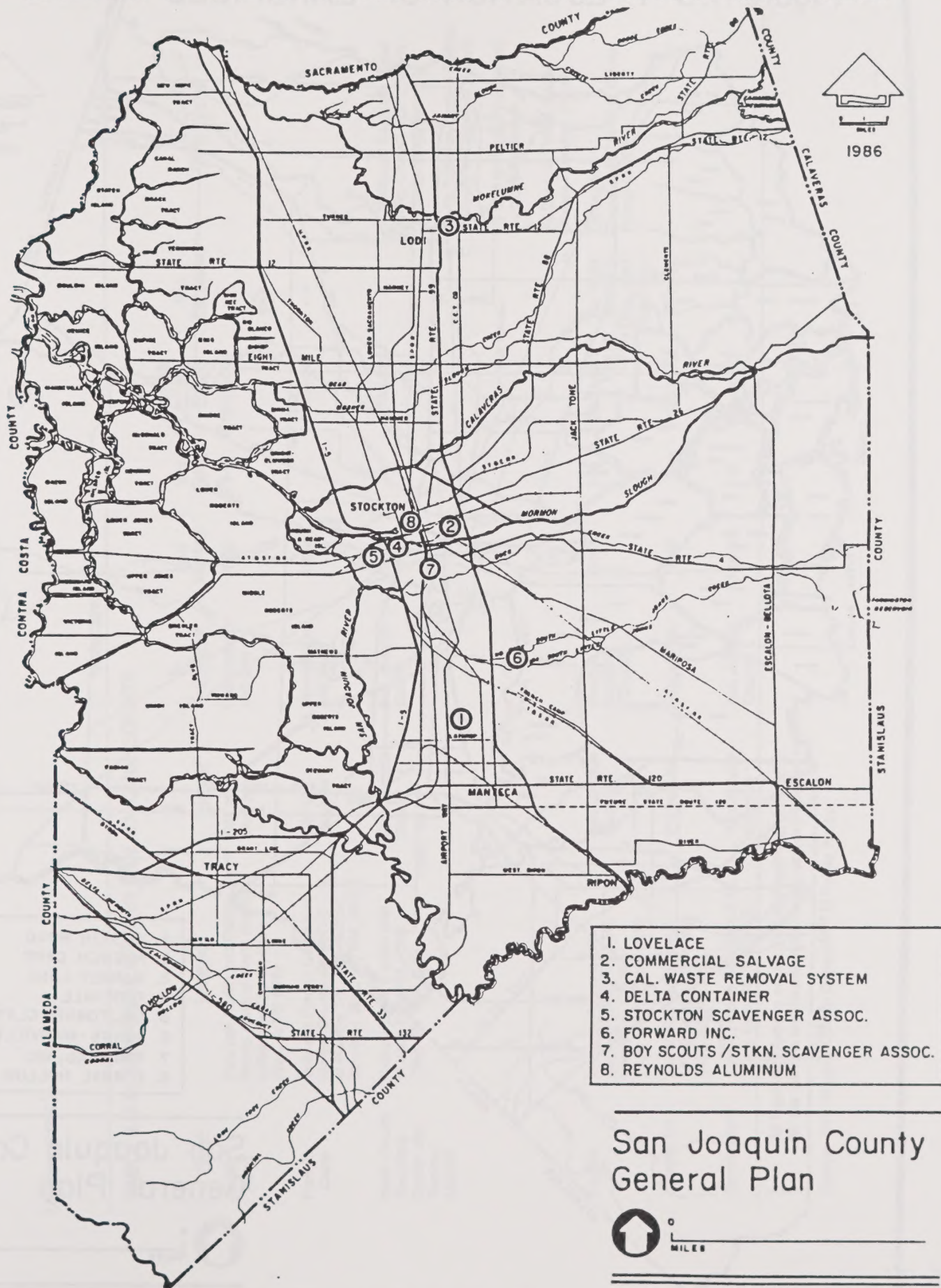
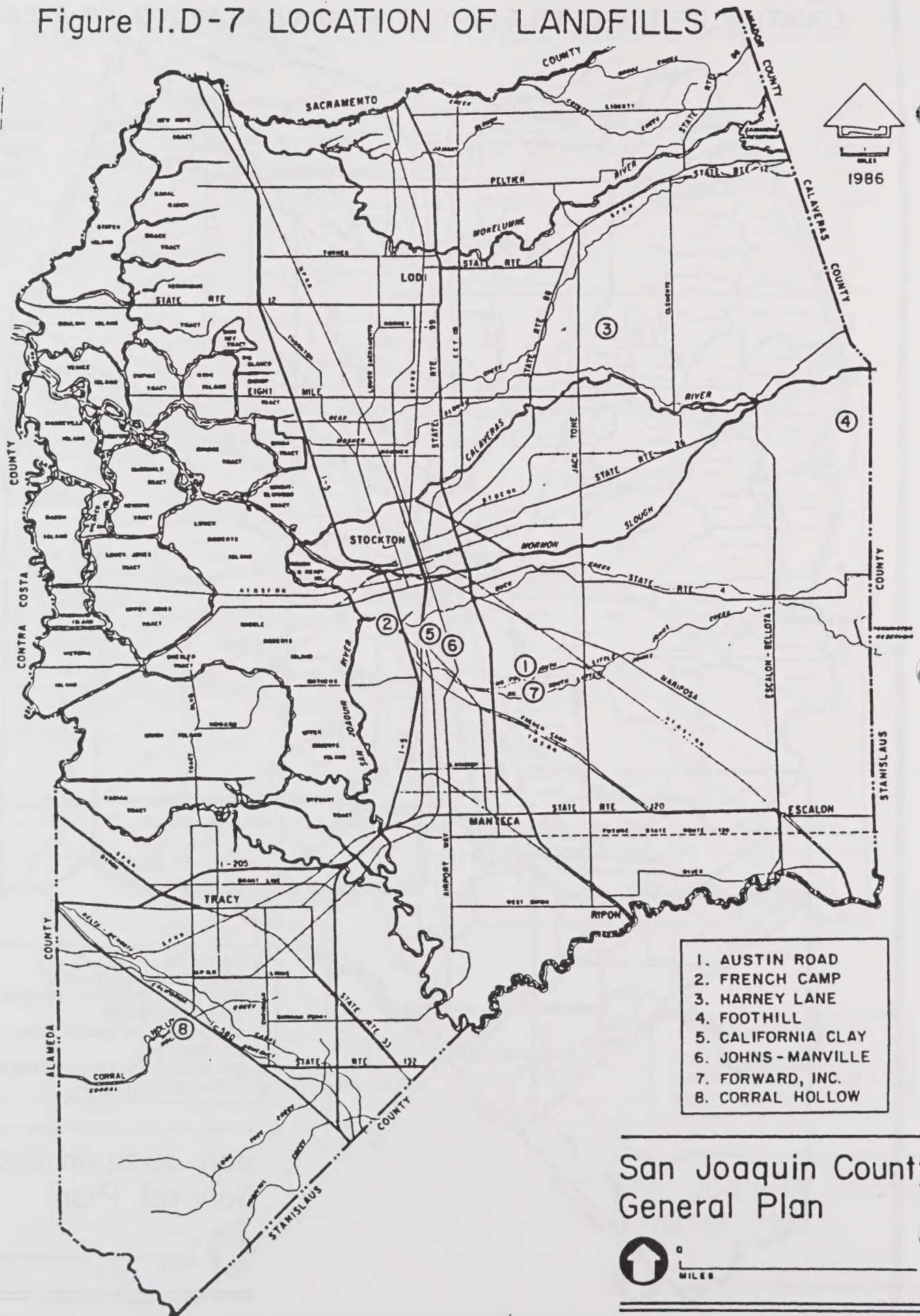


Figure II.D-7 LOCATION OF LANDFILLS



Utilities (cont.)

TABLE II.D-5: DISPOSAL SITES IN SAN JOAQUIN COUNTY

<u>Name</u>	<u>Location</u> ¹	<u>Owner</u>	<u>Operator</u>	<u>Year Opened</u>	<u>Site Class</u>	<u>AB2430 Facility Permit</u>	<u>Use Permit</u> ²	<u>Other Permit</u>
Austin Road	Between Austin and Castle Roads north of North Branch Littlejohns Cr., Stockton (Sec. 3, T1S R7E)	City of Stockton	Glambastrani and Son	1960	II-2	39-AA-001	-	-
French Camp	Between French Camp and Walker Slough west of I-5 at Manthly Rd., Intersection, Stockton (Sec. 22, T1M, R63)	City of Stockton	Glambastrani and Son	1920s	-	39-AA-002	-	-
North County Recycling Center and Sanitary Landfill	Harney Lane, 2 miles east of Jack Tone Rd., Lodi (Sec. 21, T3N, R8E)	San Joaquin County	San Joaquin County	1991	III	39-AA-022	-	(1) California Regional Water Quality Control Board-Waste Discharge Requirements. (2) Air Pollution Control District-Authority to Construct Permit. (3) N26 National Permit-Army Corps of Engineers. (4) Dept. of Fish & Game-Stream Alteration Permit.
Foothill	Waverly Rd., one mile south of Shelton Rd at Stanislaus Co. line (Sec. 12, 13, T2W, R9E)	San Joaquin County	Foothill Sanitary Landfill, Inc.	1965	III	39-AA-004	No. 3295 (8/24/65) No. 3541 (5/1/66)	California Department Forestry, Dump Permit 4-0690
Forward Inc.	Austin Rd. at So Branch, Littlejohns Cr., Stockton (Sec. 3, T1S, R7E)	Forward Inc.	Forward Inc.	1973	II	39-AA-015	U 73-9	-
Corral Hollow	Corral Hollow Rd., west of I-5, Tracy (Sec. 18, T3S, R5E)	San Joaquin County	San Joaquin County	Mid-50s	III	39-AA-005	-	-

- ¹ All legal descriptions are Mt. Diablo Baseline and Meridian.
² All use permits are San Joaquin County unless otherwise noted.

Source: San Joaquin County Department of Public Works.

**TABLE II.D-6
LANDFILL SITING IMPACTS AND MITIGATION MEASURES**

<u>Impacts</u>	<u>Possible Mitigation Measures</u>
Traffic	Require traffic improvements
Noise	Solid fence, setback from property line, buffer area
Odor	Proper compaction, proper soil cover, daily covering
Dust	Proper soil cover, spraying water on roads
Litter	Covering loads, fencing, proper compaction, soil cover, minimal size of working area
Gas Migration	Property confinement of organic matter, compaction, limiting infiltration of moisture
Vectors	Proper soil cover, compaction, minimal size of working area
Fire, explosion	Setbacks from property line, buffer area, daily cover
Groundwater	Lining and capping of landfills, monitoring pollution wells, limiting infiltration of moisture, leachate collection and removal, limitation on types of wastes received by site
Visual	Isolation of use, fencing, berms, landscaping, buffer area

Waste Reduction. Disposal facilities are expensive and difficult to site due to environmental impacts and public opposition. Therefore, it is to the county's advantage to minimize the amount of solid waste for disposal. Sale of materials or energy recovery can also lead to cost savings.

Waste reduction processes consist of reduction at source, materials and energy recovery, composting, incineration and refuse derived fuel (RDF). The latter two processes are not used in San Joaquin County. The recovery activities in the county include materials reuse or recycling and waste-to-energy conversion.

Recycling generally begins with separation of recyclable materials by individuals or businesses rather than separation of the materials after collection. The most common materials recovered are cardboard, newspaper, ferrous metal, aluminum, glass, and wood. Forward, Inc. is the only landfill where a substantial amount of materials recovery occurs. Some metal salvage occurs at Harney Lane Landfill and at Lovelace Transfer Station.

Even with the minimal emphasis on recovery, an average of approximately 2,000 tons per month of metals, glass, corrugated paper, and wood is recovered. This represents about five percent of the total wastes disposed of in the county's landfills. In addition to this, industries sell recyclable items. Other wastes, such as food processing wastes and sewage sludge and compost, are disposed of by land application.

Waste-to-energy conversion, or bio-mass conversion, has been used little in the county. At its Austin Landfill the City of Stockton has contracted for landfill gas recovery and generation of electricity for sale to P.G.&E.

Waste reduction methods have not been used extensively because it has been easier and usually cheaper to dispose of all wastes in landfills. One of the first steps necessary to determine the economic feasibility of more extensive waste reduction programs is to develop accurate measurements of the amount and composition of solid wastes. Indications are that a mass-burn incinerator with a steam turbine generator could be economically feasible in the county.

Endnotes

1. San Joaquin County, San Joaquin County Solid Waste Management Plan. Prepared by Hekimian Van Dorpe Associates, March 1986.
2. California Government Code, Sections 66700-66796.44
3. San Joaquin County, San Joaquin County Solid Waste Management Plan, 1986.
4. Ibid.

References

1. Eric Maher, California Waste Management Board. Personal communication, June 19, 1986.
2. Thomas Horton, Solid Waste Manager, San Joaquin County Public Works Department. Personal communication, June-July, 1986.

4. STORMWATER MANAGEMENT

Introduction. The terms drainage basin and watershed are used synonymously. A drainage basin is an area bounded by the water flowing and draining into a water course, river, or stream, and all the many watershed areas of its tributaries. With rainfall, some water strikes the ground and is absorbed, feeding trees and plants. Some water evaporates back into the atmosphere; some percolates into the ground replenishing the groundwater supply. The remaining water runs over the surface of the ground into creeks, streams, rivers and other water bodies, ultimately back to the sea. This remaining surface water is called "surface runoff."

A stormwater runoff system is a network of both natural and man-made elements used to collect, carry, and store rain or surface water from an individual site to the discharge to some natural water course or body of water. The purposes of a stormwater runoff system are twofold: (1) to control stormwater to prevent or minimize damage to property, persons, or the natural environment; and (2) to control stormwater to eliminate or minimize inconvenience to peoples' daily activity. A stormwater runoff system cannot be expected to prevent all inconveniences and minor property damage during an infrequent major storm. Eliminating all such hazards would be infeasible; however, flooding or undermining buildings and essential facilities should be prevented.

Historical Approaches to Storm Drainage. Past approaches to storm runoff systems sought to maximize convenience at an individual site by the elimination of excess surface water by the most rapid means possible. However, the cumulative and off-site effects of storm runoff systems have often been neglected. Impacts have included the reduction of groundwater supplies and the development of massive downstream engineering works to prevent flood damage. In other cases, older urban areas have combined both sanitary and storm drainage systems causing trunk lines and sewer treatment plants to become overloaded during the peak rainy seasons. In San Joaquin County, some older portions of the City of Stockton storm drain and sanitary systems are combined.

Desired Approach. Ideally, a storm runoff management solution should be provided for each development project based on a plan for an entire drainage basin. With the application of such an approach, the net effects of incremental urbanization and development can avoid most of the negative impacts and may produce benefits to an overall drainage basin.

Development disturbs natural drainage and increases surface runoff. A storm drain system is actually a replacement of the natural drainage course in a drainage basin. With development, the open ground and natural vegetation is replaced with non-porous surfaces. Streets, sidewalks, parking lots, roofs and other buildings, reduce ground absorption and increase the amount of surface runoff. Thus, curbs and gutters, storm drains, storm lines and retention basins are all built because man is both unwilling to suffer inconvenience nor the possible loss of life and property which may be associated with uncontrolled surface runoff.

Water falling on a given site should be absorbed or retained on-site and the quantity and rate of storm runoff leaving the site after development should be no greater than if the site had remained undeveloped. Not all storm runoff systems, however, need be constructed drainage facilities. With proper planning, natural drainage channels, creeks, streams and rivers, can be used. Preserving natural drainage courses can reduce the total cost of a drainage system and in some cases increase groundwater percolation and retention. Natural water courses can also be improved, widened and deepened, or by incorporating adjacent property, aesthetically pleasing open spaces can be created for parks and recreational use. Natural drainage channels are an excellent resource for recreational trails, bicycle, jogging, and equestrian, and can serve as open space buffers between various developed areas.

Paved and unpaved streets should also be considered an integral part of a comprehensive storm drainage plan. Stormwater runoff from paved areas, as well as part or all of adjacent buildings and yards, reaches a storm system after traveling some distance on streets and in the gutters that border them.

Drainage facilities can convey stormwater to terminal facilities such as waterways or to ponds and ditches. The desired approach for urban communities is to use terminal facilities.

Flood Hazards. The planning and design of storm drainage systems must recognize the potential of flood hazards within a drainage basin. These potential hazards are not only along major rivers and streams but can also occur along tributaries and drainageways, as well as on any specific site. Poor siting and drainage design can create considerable water damage and often a source of flooding in tributaries and headwater areas. These hazards are generally avoidable without significant cost or development.

San Joaquin County Department of Engineering is responsible for the review and design of storm drainage requirements in the unincorporated county areas, while city engineering departments review projects within their separate jurisdictions. Coordination between the various agencies and governmental departments concerned with flood control and storm drainage systems occurs during project reviews.

Future Needs. A San Joaquin County Storm Drainage Master Plan was completed and adopted in January 1973. This plan was prepared for all areas shown as urbanized on the county General Plan but did not include those areas indicated for agricultural or industrial reserve uses. The study period for the plan extended through the year 1990, corresponding to the General Plan land use and population projections in 1970. Since the adoption of the plan, numerous storm drainage improvements have been completed. Changes have also occurred in population and growth projections, as well as updates to the Master Plan and county General Plan. A new storm drainage master plan should be completed to account for recent changes and future projections.

Estimates of future growth by land use type, density and intensity should be compiled for each drainage basin. This data along with storm and flood frequency data, soil characteristics and sub surface geology, and lot coverage estimates can be used to determine storm drainage system requirements, including size, location, and design of lines, relationships to existing drainage facilities, financing, and schedules and priorities of improvements.

References

1. The Urban Land Institute, the American Society of Civil Engineers, the National Association of Home Builders. Residential Storm Water Management: Objectives, Principles and Design Considerations, 1975.
2. Curtin, Jr., Daniel J. California Land-Use and Planning Law, Berkeley, California: Solano Press, 1987.
3. State of California, Planning, Zoning, and Development Laws, The Subdivision Map Act, Title 7 of the California Government Code. Sacramento, California: Office of Planning and Research, February 1985.
4. Dennis Cotes, San Joaquin County Department of Public Works. Personal communication, March 24, 1988.
5. San Joaquin County Department of Public Works, Storm Drainage Study and Master Plan. Prepared by R.W. Siegfried & Associates and George S. Nolte and Associates, January 1973.
6. San Joaquin County Department of Public Works, Storm Drainage Map. Prepared by R.W. Siegfried & Associates and George S. Nolte and Associates, January 1973.
7. San Joaquin County Department of Public Works, Manual for Storm Drainage Design. Prepared by R.W. Siegfried & Associates and George S. Nolte and Associates, January 1973.

5. UTILITY CORRIDORS

Power Transmission Lines. Electrical transmission lines and facilities permit electrical power to be generated at considerable distances from the point of consumption. Transmission lines allow greater choice in the location of remote sites for power generating facilities—hydro-electric dams, power plants, etc.—and allow utilities to exploit economies of scale in power generation. Furthermore, transmission facilities make possible the transfer of electric energy between power systems. The components of transmission and distribution systems include the generating facility, switching yards and stations, primary substation, distribution substations, distribution transformers, various sized transmission lines, and the customers. In the United States, there are over a quarter million miles of transmission lines, most of them capable of handling voltages between 115 kv and 345 kv, and a handful of systems of up to 500 and 765 kv capacity. Transmission lines are rated by the amount of power they can carry, the product of the current (rate of flow) and the voltage (electrical "pressure"). Generally, transmission is more efficient at higher voltages.

Generating facilities, hydro-electric dams, and power plants usually produce electrical energy at fairly low voltages, which is then increased by transformers in substations. From there, the energy proceeds through switching facilities to the transmission lines. At various points in the system, the energy is "stepped down" to lower voltages for distribution to customers. Thus, power lines are either high voltage (115, 230, 500 and 765 kv) transmission lines or low voltage (12, 24, and 60 kv) distribution lines.

Overhead transmission lines consist of the wires carrying the electrical energy (conductors), insulators, support towers and grounded wires to protect the lines from lightning (called shield wires). Towers must meet the structural requirements of the system in several ways. They must be able to support both the electrical wires, the conductors, and the shield wires under varying weather conditions, winds, ice loading, etc. as well as a possible unbalanced pull caused by one or two wires breaking on one side of a tower. Every mile or so, a "dead-end" tower must be able to take the strain resulting if all the wires on one side of a tower break. Every change in direction requires a special tower design. In addition, the number of towers required per mile varies depending on the electrical standards, weather conditions, and the terrain. All towers must have appropriate foundations and be available at fairly regular spacings along a continuous route accessible for both construction and maintenance.

A right-of-way is a fundamental requirement for all transmission lines. A right-of-way must be kept clear of vegetation that could obstruct the lines or towers by falling limbs or interfering with the sag or wind sway of the overhead lines. Land acquisition and maintenance requirements can be substantial. The dimensions of a right-of-way depends on the voltage and number of circuits carried and the tower design. Typically, rights-of-way range from approximately 100 feet to 300 feet in width.

Land use development associated with transmission lines include construction, such as building foundations for towers and assembling towers; right-of-way maintenance, including use of manual or

chemical means of controlling or removing vegetation; and access to the right-of-way by construction and maintenance equipment.

Grid System. The electric power supply grid within San Joaquin County is part of a larger supply network operated and maintained by the Pacific Gas and Electric Company which encompasses the entire northern California region. This system ties into yet a larger grid known as the California Power Pool which connects with the San Diego Gas and Electric and the Southern California Edison Companies. This pool of companies coordinates the development and operation, as well as purchase, sale and exchange, of power throughout the State of California.

Power Source. There are no Pacific Gas and Electric Company electric power-generating plants within San Joaquin County. Figure II.D-8 indicates the location of major transmission lines that run through San Joaquin County. Typical right-of-way widths for tower lines are 80 feet for 115 kv, 100-120 feet for 230 kv and 200 feet for 500 kv transmission lines. Table II.D-7 indicates the capacities and names of PG&E power-generating facilities in excess of 50 MW which serve the northern California grid of which San Joaquin County is a part of.

Issues. Both transmission and distribution lines are of concern in the planning of San Joaquin County. Transmission lines issues include:

- o Visual or aesthetic concerns related to the appearance of an area with transmission lines;
- o Land use allocation concerns related to the amount of land needed for rights-of-way lines, which could also be used for other purposes;
- o Land use conflicts with adjoining properties which may require an extra degree of separation between the transmission line and other uses (e.g., the lines should not be located within an airport clear zone);
- o Ecological impacts on the soil, water, flora and fauna from transmission facilities construction and right-of-way maintenance;
- o Public health effects from low-frequency magnetic fields; and
- o Safety and security concerns from breaks in power lines.

Figure II.D-8 MAJOR TRANSMISSION LINES

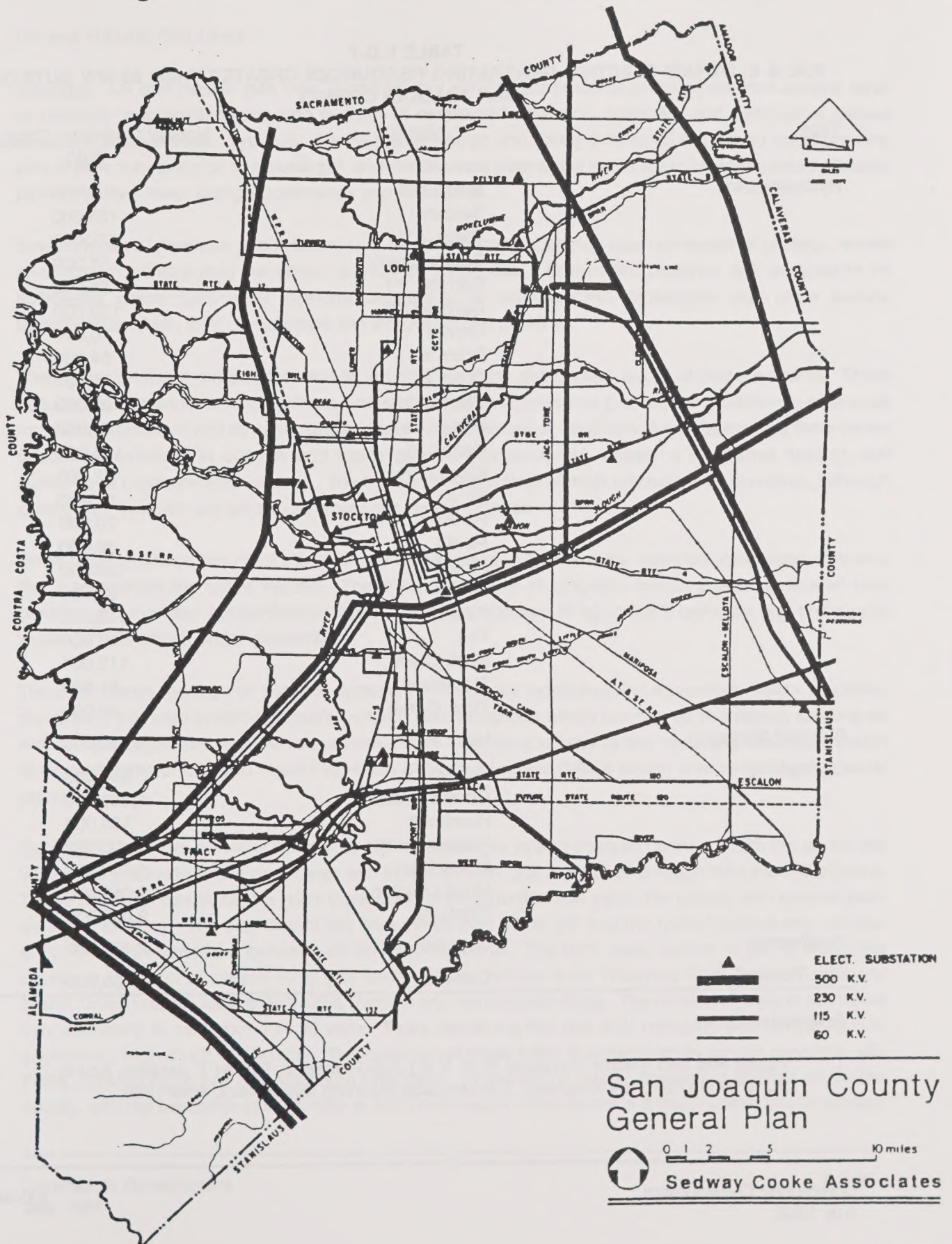


TABLE II.D-7
P.G. & E. OWNED ELECTRIC GENERATING RESOURCES GREATER THAN 50 MW OUTSIDE
SAN JOAQUIN COUNTY

<u>Type</u>	<u>Name</u>	<u>Normal Operation Capacity</u> <u>(KW)</u>
Hydroelectric	Balch #2	105,000
	Belden	125,000
	Black, J.B.	172,000
	Buck's Creek	57,000
	Caribou #1	75,000
	Caribou #2	120,000
	Cresta	70,000
	Drum #1	54,000
	Drum #2	49,500
	Electra	92,000
	Haas	144,000
	Kerckhoff	155,000
	Kings River	52,000
	Pit #1	61,000
	Pit #3	70,000
	Pit #4	95,000
	Pit #5	156,000
	Pit #6	80,000
	Pit #7	112,000
	Poe	120,000
	Rock Creek	112,000
	Stanislaus	91,000
	Tiger Creek	58,000
Pumped Storage	Helm P.G.P.	1,212,000
Oil/Gas	Potrero	366,000
	Contra Costa	1,260,000
	Humboldt	105,000
	Hunters Point	429,000
	Morro Bay	1,002,000
	Moss Landing	2,060,000
	Pittsburg	2,022,000
Geothermal	Geysers	2,482,000
Gas Turbine	Oakland	165,000

References:

1. Pacific Gas and Electric company (P.G. & E.) San Francisco, Robert T. Jenkins, Acting Supervising Electrical Engineer, Transmission Planning Department, April 1989.

Oil and Natural Gas Lines.

Pipelines. Oil and natural gas lines permit oil and natural gas products to be piped from several small or relatively inaccessible extraction facilities to centralized collection, treatment and distribution centers for public consumption. Typically, the degree of design and safety provisions are based upon both the size of pipe conveying oil or natural gas and the distance over which these are to be transported. Smaller pipelines have fewer design constraints and limitations.

Several types of pipelines and systems may be considered depending upon concerns of geology, terrain and ecology. Pipes may be above surface or embedded. Embedded pipelines are required to be sufficiently below surface to minimize damage from rodents, farm implements and other surface uncertainties which may compromise the integrity of the pipeline.

There are significant structural concerns which govern the design and layout of these systems. These include allowances for soil subsidence and stability, seismic concerns (i.e. requiring additional pipe slack for shifting), ambient and dynamic pressures of earth movement, variations due to freeze and thaw cycles (including variations in outside and inside pipeline temperatures), problems of internal waxing, and concerns of corrosion and leakage. The transport mechanism of most systems is by pumping, although gravity flow systems are also used where the terrain permits.

Given the hazardous nature of the products being transported, there are major environmental concerns that predominate the entire system. These include issues of long-term health effects generated from possible groundwater contamination through leakage, damage to agricultural products and crops, and wildlife and livestock endangerment.

These concerns require that pipeline systems be constantly monitored and accessible. Major pipelines, particularly pumped systems, require periodic control centers which function as monitoring stations as well as flow regulation and service access points. Physical access to the system is assured through dedicated rights-of-way and visual inspection of the system over difficult terrain is accomplished by aerial patrolling.

Gaslines. There are primarily three sources of natural gas in San Joaquin County. From the south, the STANPAC gasline from El Paso, Texas and from the north, gas is supplied through the Line 108 pipeline. These pipelines constitute the main trunk lines running north-south within the county with several east-west branch lines. The diameter of the lines varies from 16" to 26" and the typical right-of-way corridor is 30', although variations between 20'-50' may be found. The third major source of gas is within the county in the form of several local gas fields. These include West Thornton, East Thornton, Roberts Island, Union Island, Lathrop, McMullin, Vernalis and the Stockton fields. The number of wells in each field vary according to size from 1 to 20 wells. Pipes conveying this gas after odorizing and dehydration at source vary from 4"-12" in diameter. The operation of these fields is undertaken by private concerns with PG&E contracting to buy and distribute from them. There are no major compressor stations within the county, with the exception of the facility at McDonald Island which contains a major underground storage

facility and gas field. The design and operation guidelines of such pipeline systems is subject to conformity with the California Public Utilities Commission General Order 112D.

Water Transmission Lines. San Joaquin County is primarily served by over 50 water supply companies which rely on wells which tap water from the Eastern San Joaquin County Groundwater Basin. Consequently, there are no major transmission lines in the county with the exception of lines feeding the East Stockton Water Treatment Facility which supplies both irrigation and potable water to the unincorporated areas of Stockton, Lincoln Village and Colonial Heights water maintenance districts, and other unincorporated portions of San Joaquin County. Its primary source of water is from the New Hogan Dam Reservoir. Water is released to the Calaveras River from which a 54"-diameter, 13.3-mile-long pipeline is used to convey it to the treatment plant.

Four major water transport corridors convey water through San Joaquin County. While these systems do not discharge water to the county, they are part of a larger water supply network for the region. Towards the northern half of the county, the East Bay Mud Company has three parallel pipelines known as the Mokelumne Aqueducts running east-west 82.2 miles across the county connecting the Pardee Reservoir in Calaveras County to the Lafayette Aqueducts in Contra Costa County. Also running east-west along the southern tip of the county is the Hetch Hetchy Aqueduct which conveys water from the Don Pedro Reservoir in Tuolumne County to the San Francisco metropolitan area and is managed by the San Francisco Water District.

Two roughly parallel water transport systems pass north westerly through the southern portion of the county. The California Aqueduct is managed and maintained by the California Department of Water Resources. It is a gravity flow concrete lined canal that flows from the Bethany Reservoir in Alameda County in a southeasterly direction to the San Luis Reservoir in Merced County. It does not discharge any water to San Joaquin County and is controlled by a centralized automated facility in Alameda County. The California Department of Water Resources has only a few service yards within San Joaquin County which are adequate to maintain that portion of the canal.

Parallel to the California Aqueduct is the Delta-Mendota Canal which is operated by the Central U.S. Bureau of Reclamation. This canal begins at the Tracy pumping station near Byron in Contra Costa County and ends at the Mendota Pool near the City of Mendota in Fresno County. The canal is approximately 100' wide with an average right-of-way of 300'. It discharges water at four locations within San Joaquin County:, including the Banta-Carbona, Hospital, Plainview and the Westside irrigation districts. The primary use of this water is for irrigation purposes, although some water is treated in the Banta-Carbona irrigation district for industrial and urban uses. The City of Tracy also taps some water for treatment and distribution for urban and domestic use. Within San Joaquin County there are no manned monitoring or control stations for the Delta-Mendota Canal.

Future Developments. Transmission pipe lines in the future could be used for transporting all sorts of materials to large urban centers or distribution points. These pipe lines could transmit agricultural products.

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6. East Bay Municipal Utility District, Oakland. Elizabeth Randall, March 1989.
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The first part of the report is a general introduction to the project. It describes the purpose of the study and the objectives that were set at the beginning of the project.

The second part of the report is a detailed description of the methodology used in the study. It includes information about the data collection methods, the sample size, and the statistical tests that were used to analyze the data.

The third part of the report is a discussion of the results of the study. It describes the findings of the research and compares them to the previous research in the field.

The fourth part of the report is a conclusion. It summarizes the main findings of the study and provides some suggestions for future research.

The fifth part of the report is a list of references. It includes all the sources that were used in the study, such as books, articles, and websites.

The sixth part of the report is an appendix. It contains additional information that is not included in the main body of the report, such as raw data, questionnaires, and interview transcripts.

The seventh part of the report is a glossary. It defines the key terms and concepts that are used in the report.

The eighth part of the report is a list of figures and tables. It includes all the visual aids that are used in the report, such as graphs, charts, and tables.

The ninth part of the report is a list of abbreviations. It defines the abbreviations that are used in the report.

The tenth part of the report is a list of acknowledgments. It thanks the people and organizations that helped with the study.

The eleventh part of the report is a list of appendices. It includes all the additional information that is provided at the end of the report.

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E. PUBLIC FACILITIES

1. RECREATION

Benefits of Recreation. Recreation benefits society through its positive effects on the individual, the economy, and the natural resources of an area. As our society becomes more urbanized, recreation, like many facets of our lives, becomes more formalized. It becomes a function of society to ensure that opportunities for recreation are available for all economic groups. Recognizing this fact, San Joaquin County has provided recreation opportunities for all its residents. Parks should be considered a necessity, not a luxury.

In a County rich in recreational opportunities, recreation is an important aspect of the economy. The economy benefits from employment, business opportunities, and the tax revenue that recreational opportunities generate. Recreation-related businesses include manufacture and sales of equipment and supplies, boat berthing and storage, food and drink sales, overnight lodging, and equipment repair. Of course, there are also public costs associated with recreation. Unfortunately, no comprehensive study of the value of recreation to the County's economy has been done.

Many of the County's natural resources, such as the waterways, riparian vegetation, oak groves, and wildlife, are a valuable part of the County's recreation system. They are being preserved because of people's recreational enjoyment of them.

Determinants of Recreation Activity. Recreation activity and the recreation experience are determined by several factors: 1) climate and weather, which are uncontrollable; 2) factors that are dependent on the individual and that vary with education, income, age, time, skill, money and equipment, stamina, social interactions, interest; and 3) factors influenced by government.

Those factors that are dependent on the individual change from one generation to the next, or even from year to year. The recreation system cannot always meet all the demands of the moment. It is up to the policy makers to decide whether in some cases it should even try. It is important, however, that future recreation areas and facilities be flexible to change.

Specific issues that will be emphasized in this chapter are natural resources, developed areas and facilities, and accessibility of resources and facilities, because they are the ones that must be considered in future public planning.

Natural Resources for Recreation in San Joaquin County. San Joaquin County residents have not only the recreational areas of the Sierra Nevada Mountains and the California coast within easy reach, but also numerous recreational resources within the County. Most regional parks and many local use parks have been located at and designed around the natural features of a site. These parks have been created to protect resources and to benefit from them. Maintenance of the recreational value requires protection of the natural resources. The resources addressed in this section include the County's waterways, the Delta, and significant resource areas.

Waterway Use. Waterways are the most obvious recreational resource in an area with long, hot, and dry summers. Waterway activities include fishing, boating, water skiing, swimming, hiking, nature study, and other quiet activities, such as viewing the water and the boats. Excluding canals, drains, creeks, and standing waterbodies, there are a total of about 400 miles of waterways in the County, with 300 miles of them in the Delta.¹ The Delta, the Stanislaus River, the Mokelumne River, and the Camanche Reservoir are the most important water recreation areas in the County. The water-related resources needing protection because of their contribution to recreation opportunities include:

- fisheries
- riparian vegetation
- wildlife habitat
- freshwater marshes
- aesthetic beauty
- water quality
- water flow and supply
- water surface
- upland along water
- fish and wildlife
- unveeved channel islands
- beaches
- public access
- views of and from the water

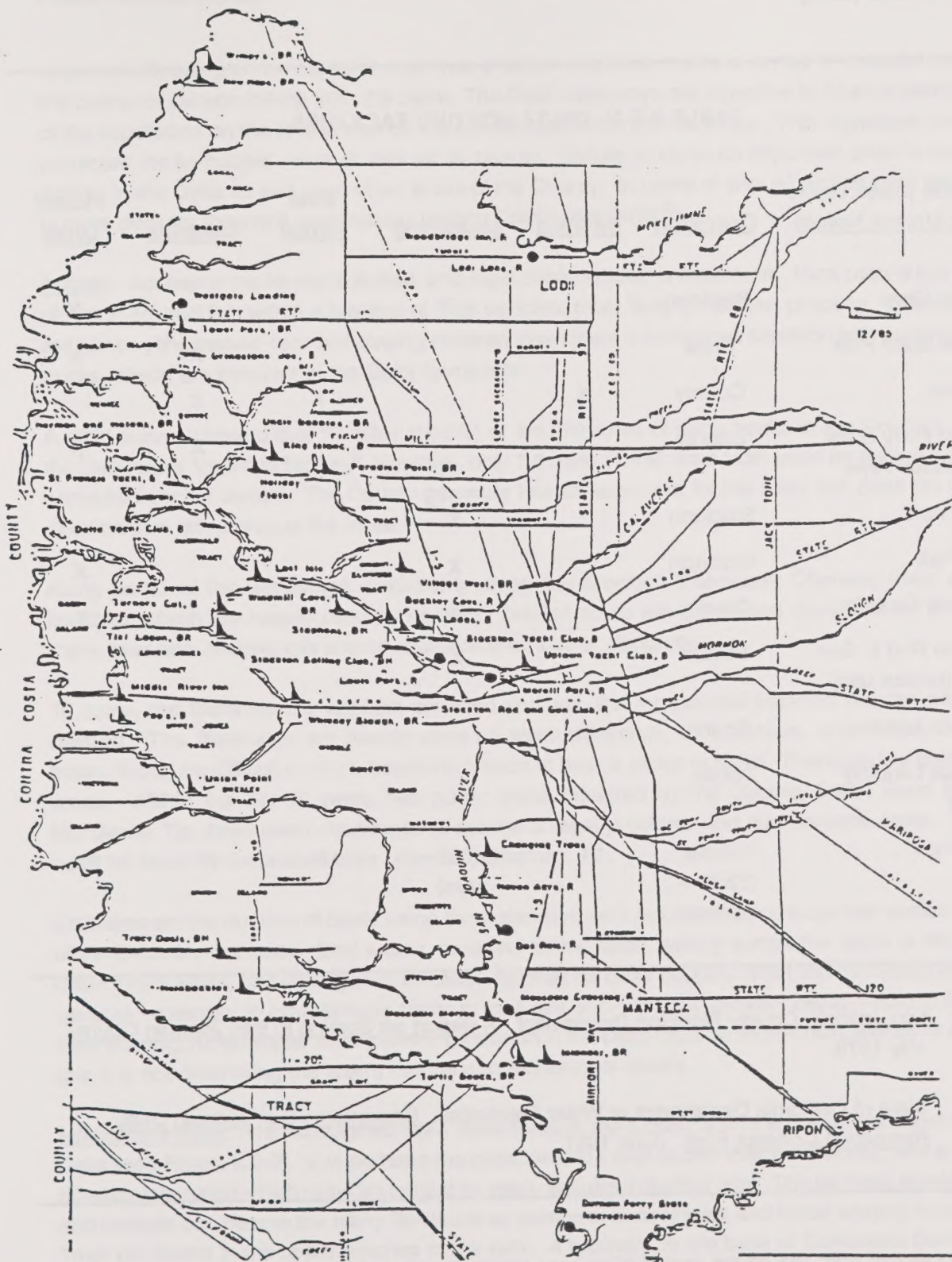
Recreational use depends continually on the quality and quantity of the water. Factors diminishing recreational use include safety of the waters for bodily contact, ingestion of pesticides and heavy metals by the fish, harm to the fishery by increased salinity levels, and the effect of reduced flows on water quality.² Many potential beaches should be closed to swimming because of high coliform bacteria levels. Other potential problems are overuse, litter, and trespass onto private lands. Although many people use the waterways, there are few public recreation areas for access. With additional public recreation areas, recreational use could be localized and better managed to avoid problems on adjacent lands.

The Delta. The California Delta, with half of its waterways in San Joaquin County, is the County's single most important recreational asset. More than seven million recreationists spent almost 11,900,000 recreation days in the Delta in 1977-78. Their expenditures in the Delta in that year alone were estimated at \$73 million. The State's Delta Outdoor Implementation Plan projects 13,607,890 recreation days by the year 1990.³

Activities. Delta boating facilities are shown in Figure II.E-1 and described in Table II.E-1. They include several sites in public ownership, 30 marinas open to the public, as well as numerous boating clubs that have facilities in the Delta. Despite the number of Delta facilities, access to the waterways is limited. In order to fully appreciate the beauty of the Delta, a boat is necessary.

Excursions on the waterways are few and mainly limited to the Stockton Deepwater Channel. Small fishing boats and houseboats can be rented.

Figure II.E-1 DELTA BOATING FACILITIES



San Joaquin County
General Plan

0 1 2 5 10 miles
Sedway Cooke Associates

- ▲ PUBLIC MARINA
- OTHER FACILITIES (Public)
- BERTHING
- ▲ PRIVATE MARINA
- OTHER FACILITIES (Private)
- RAMP
- MOIST

TABLE II.E-1: DELTA BOATING FACILITIES

<u>Location (Open to the Public Unless Noted)</u>	<u>Operation</u>	<u>Berthing</u>	<u>Launching</u>	<u>Boat Rental</u>	<u>Camping</u>	<u>Picnic/ Drink</u>
Buckley Cove	Stockton		X			X
Caswell State Park	State				X	X
Dos Reis	County	X		X	X	
Durham Ferry State Recreation Area	County				X	X
Morelli Park	Stockton		X			
Louis Park	Stockton		X			X
Mossdale Crossing	County		X			X
Stockton Rod & Gun Club (private use)	Private		X			
Westgate Landing	County	X			X	X
Westgate Landing Island	State					
30 Marinas	Private (2200 + berths)	21	13 (500 + sites)	15	16	21

Source: San Joaquin County Planning Department. A Report on Boating in San Joaquin County. July 1979.

State of California Department of Water Resources. Sacramento-San Joaquin Delta Recreation Concept Plan. June 1981.

Many people fish from the banks and families may spend the day or even the entire weekend on the levees, engaged in a number of activities, e.g., picnicking, swimming, and fishing.⁴ The levees, necessary

to prevent flooding of the adjacent land that is below sea level, create a sense of peaceful isolation for the boater or person fishing from the bank. The Delta waterways are attractive to boaters partly because of the vegetation on the levees and on the tule islands within the waterway. This vegetation needs to be protected for its habitat value as well as its beauty. Nature study is an important passive recreational activity in the Delta as well as in other areas of the County. In terms of annual participation nature study is more popular than golf and boating among County residents.⁵

Access. Access to the levees is limited, and legal public access is even rarer. Most people pull their cars off the road and fish within a few feet of their vehicles, most likely on private property. Since the levees are narrow, the parked cars and playing children may create a hazardous situation with passing cars and trucks, which are frequent in the Delta farmlands.

A 1977 survey showed that 77 miles (13.3%) of the 570 miles of levee banks in the County's portion of the Delta were "open" to fishing.⁵ However, only 7.8 miles (1.4%) were both used for fishing and publicly controlled and/or owned. The County generally has an easement for the road, but does not have legal documented ownership of the levee.

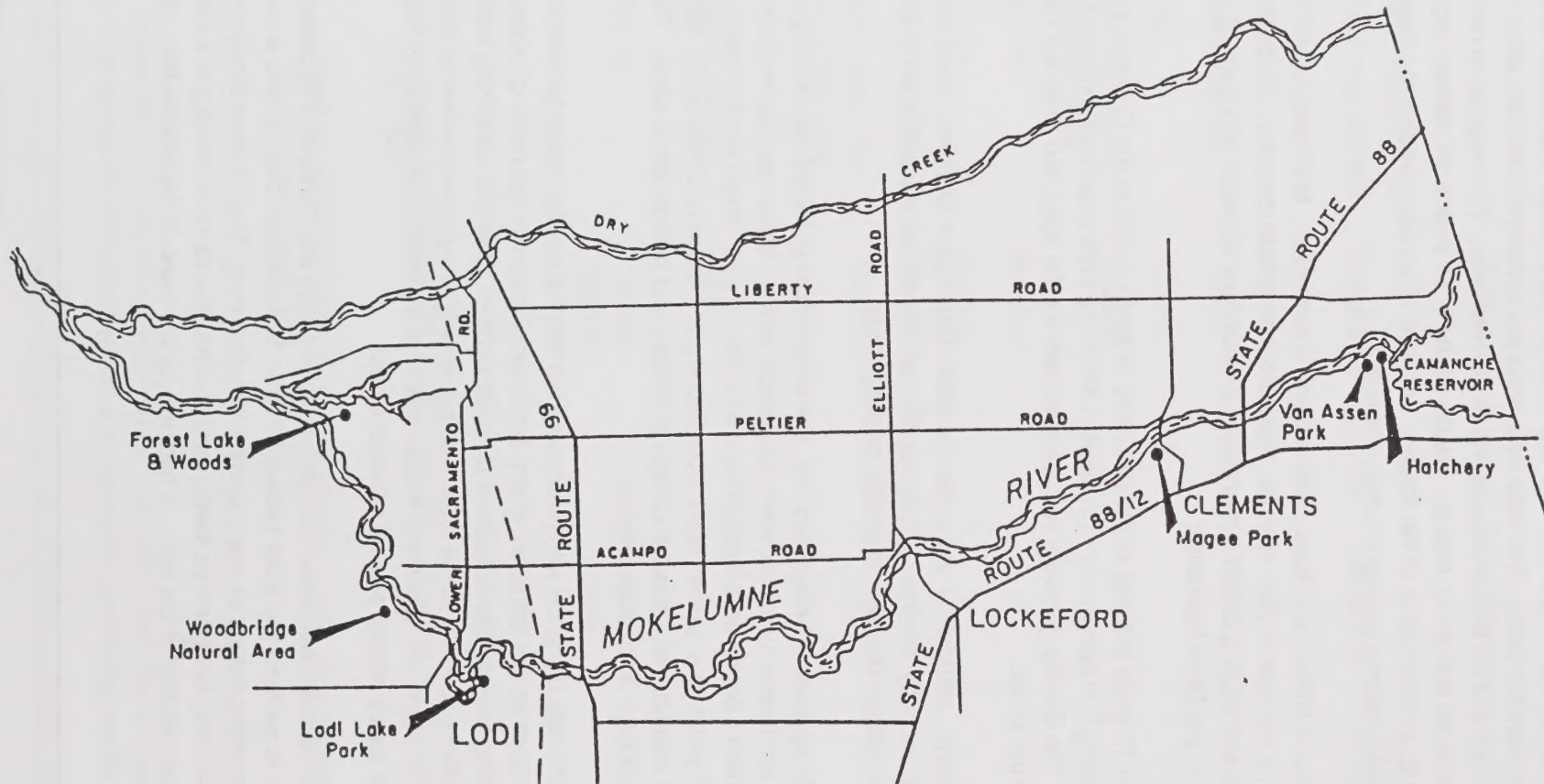
Along some of the waterways, particularly along the Stockton Deepwater Channel, there are sandy beaches, which are heavily used by boaters. Dredge spoils are sometimes deposited on or in front of these beaches, making this scarce resource unusable or dangerous.

To some, the Delta already appears crowded and, yet, the recreational potential has not begun to be realized. The waterways are heavily used on warm weekends, with cruisers, waterskiers, and fishing boats. It can be difficult to find a beach on a levee to have a picnic or swim. There are few public access areas. Within the last 10 years, two public areas operated by the County, South Spud Island and Mandeville Tip, have been abandoned, because of legal problems and maintenance costs. There is a need for boating destination sites other than marinas.

Estimates on the number of boats using the waterways vary, but there is no doubt that sometimes areas of the Delta are overused. Boat wakes, daredevil skiers, boats tacking across the paths of others, skiers down in the water, and fishing lines all cause hazards for other boaters. With the conflicting uses it may become necessary to establish use zones in the Delta, with certain waterways being limited to fishing and slow boating, for example. In any event, recreation in the Delta must be monitored carefully to make sure that it is not destroying the area's natural and recreational assets.

Mokelumne River. The Mokelumne River flows through the County from the Camanche Reservoir to the Delta (see Figure II.E-2). It is perhaps the most beautiful river in San Joaquin County, and is lined with riparian vegetation which provides habitat for many animals including deer. The tall trees shade the water and provide coolness to the many fish (such as salmon and steelhead) and those wishing to catch them. Trout are found in the upper reaches of the river. A hatchery, at the base of Camanche Dam, releases

Figure II.E-2 MOKELUMNE RIVER



San Joaquin County
General Plan



fish into the river periodically.² The river also contains resident warm water game and nongame species. Snags in the river, although a hazard to motor boating, provide sheltered resting areas to young fish migrating to the sea. In addition to fishing, tubing and rafting are popular sports on the river. These activities have become so popular that the river is congested on summer weekends.

Camanche Reservoir, extending into Amador and Calaveras counties as well as San Joaquin, provides recreation areas on both the north and south shores. The recreation activity at the reservoir, which is owned by the East Bay Municipal Utility District, is managed by a tri-county board. Boating, swimming, camping, and picnicking are available at the reservoir.

Two County parks, Van Assen and Magee, provide access to the Mokelumne, but more areas are needed. The number of people at Van Assen Park exceeded 60,000 in the summer of 1980 (June-August), but 20,000 to 25,000 seems to be more typical the last four years.⁷ Below Magee Park, the flow of the river slows and there are few floaters.

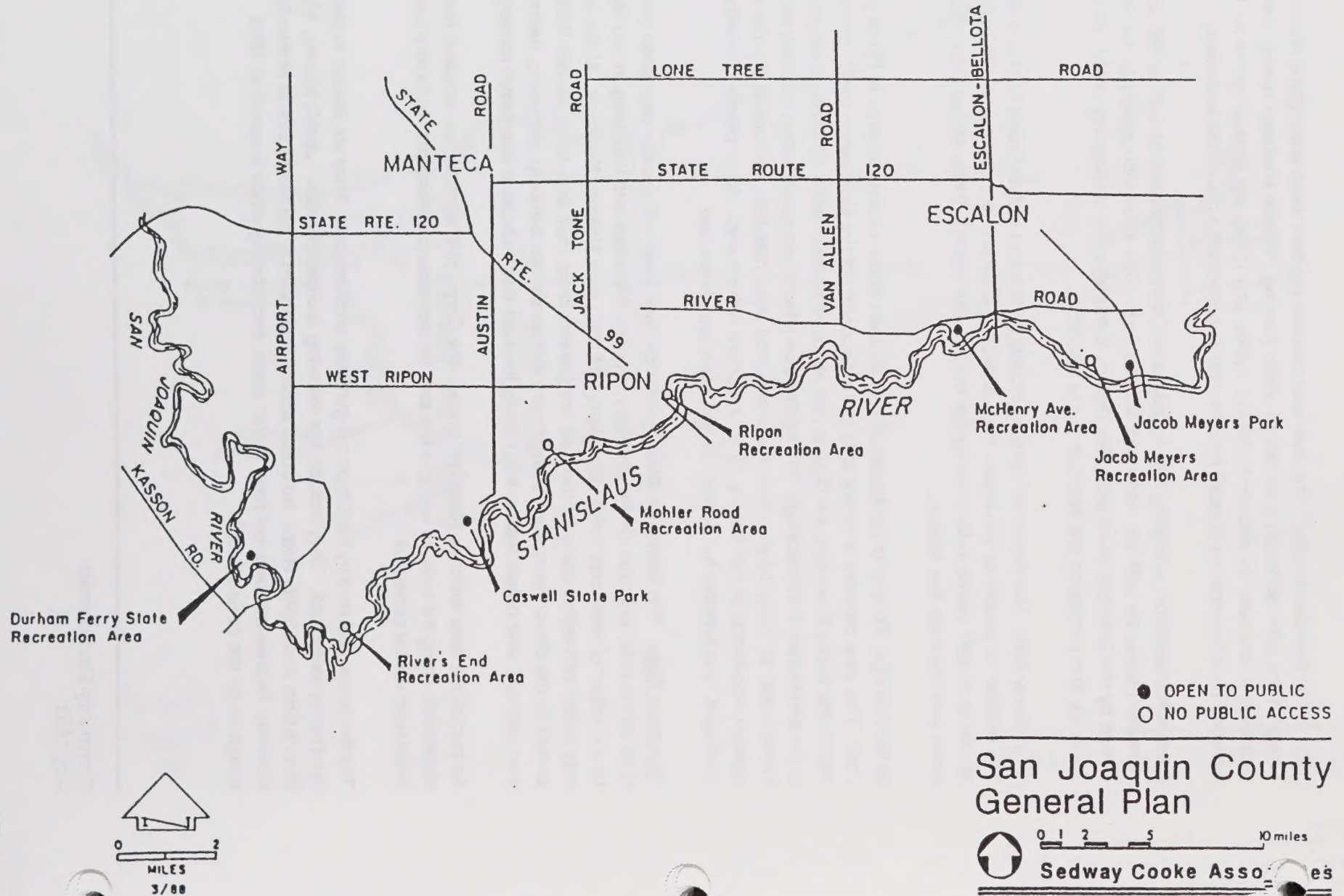
At Woodbridge, the flow of the Mokelumne is diverted in the warmer weather to fill the lake at Lodi Lake Park. This park contains a nature area in the floodplain of the Mokelumne River. Further downstream, also in the river's floodplain, the County has acquired approximately 15 acres of wooded area adjacent to the community of Woodbridge. Still further downstream is an area known variously as Brovelli Woods, Forest Lake, or Tracy Lake, containing a seasonal lake, meadow, and one of the few remaining large riparian woodlands in the County. This important natural area, still in private ownership, needs to be protected. It is suitable for minimal development and public use.

Stanislaus River. The Stanislaus River is a narrow river lined with riparian vegetation (see Figure II.E-3). Flow on the river, which forms the boundary between Stanislaus and San Joaquin counties, is controlled by a number of reservoirs further upstream, including New Melones Reservoir. At the present time the only public recreation areas on the river are Caswell State Park and Jacob Meyers Park, a picnic area owned by the city of Riverbank. Caswell, with 258 acres, has camping, picnicking, swimming (when the river permits), and nature walks. It is heavily forested and includes a blue heron rookery.

As part of the New Melones Reservoir project, the Corps of Engineers has acquired flood and riparian easements along the river, as well as a few sites for recreation development. In these areas, the extensive vegetation will be protected.

The five areas acquired by the Corps are generally undeveloped. They are located in the floodplain and are heavily vegetated. They include the following recreation areas: Jacob Meyers, McHenry, Ripon, River's End, and Mohler Road. No public access is planned at the River's End or Mohler Road sites. The McHenry Recreation Area will have picnic areas and boating when it opens in 1988. Plans are not complete for the other areas.⁸

Figure II.E-3 STANISLAUS RIVER



Calaveras River. Flows on the Calaveras into San Joaquin County are regulated by New Hogan Dam. At Bellota the major flow of the river is carried by Mormon Slough to Stockton, where the Diverting Canal returns it to the Calaveras proper. The banks of the Calaveras River and the Diverting Canal are wide and an informal trail system has been developed for equestrians and hikers. There appears no chance to establish a fishery until more water is available, either by the enlargement of New Hogan or by the construction of Folsom South Canal. Although salmon frequently migrate up the river, the establishment of a fishery would require regular releases from New Hogan; these releases might conflict with the flood control and water supply functions of the reservoir.

Other Waterways. Several other waterways have important recreation potential.

Folsom South Canal. An extension of this canal from Sacramento County into San Joaquin County is planned. The amount of water negotiated for the County needs to be adequate not only to supply irrigation needs, but also to supplement the flows in the Calaveras for the fishery.

Delta Mendota. This canal, part of the U.S. Bureau of Reclamation project, carries water from the Delta south to San Luis Reservoir. No legal recreation sites abut it in San Joaquin County, but fishing sites have been constructed in other counties.

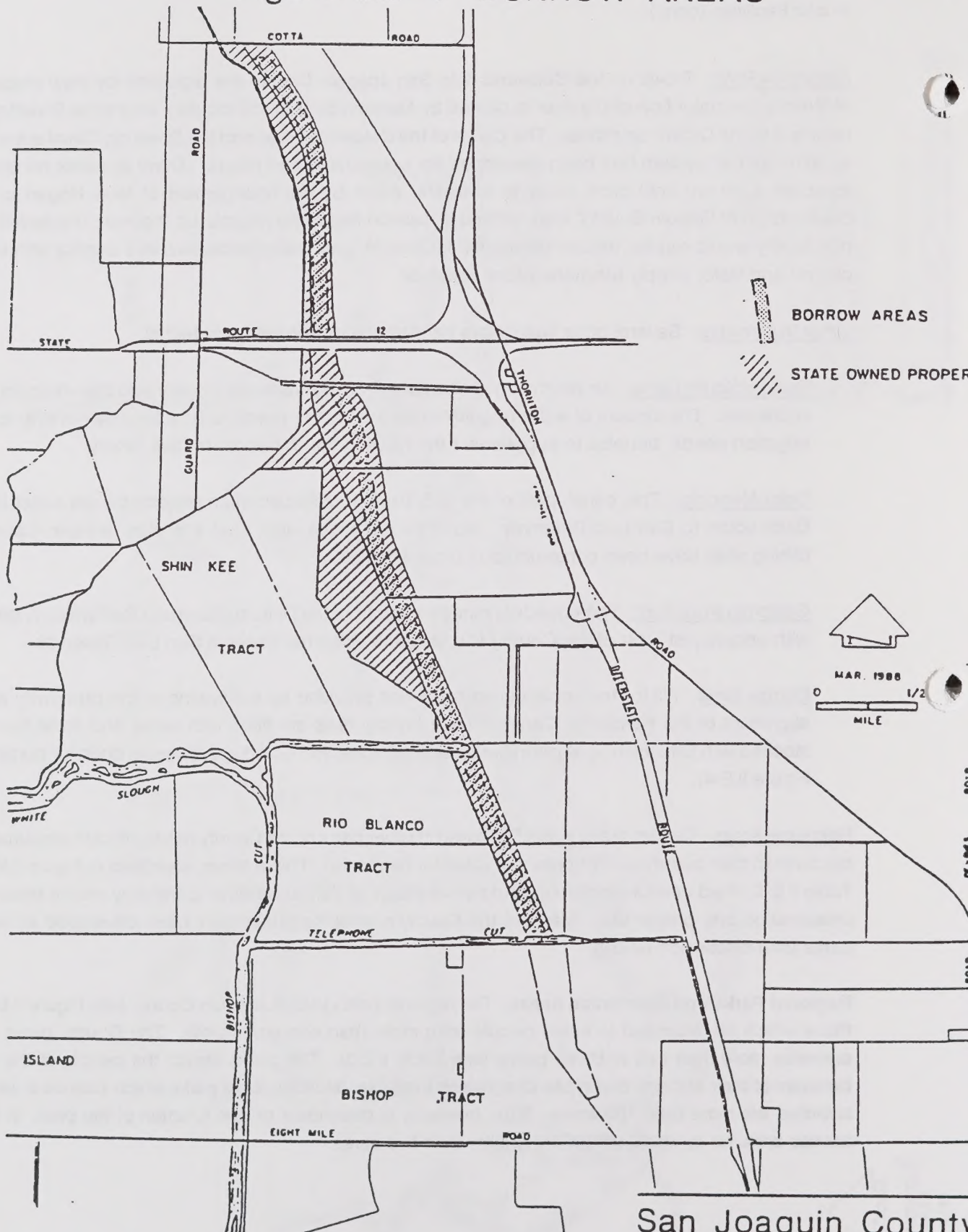
California Aqueduct. The aqueduct carries water from the Delta to Southern California. A bike path, with access just west of the County line, extends along the canal to San Luis Reservoir.

Borrow Sites. Fill for the construction of I-5 was provided by excavating in the previously planned alignment of the Peripheral Canal. These borrow sites are filled with water and most have been stocked with fish. Fishing is permitted in several areas and an adjacent area is open for hunting (see Figure II.E-4).

Resource Areas. Certain areas in the Delta and in other parts of the County are significant resource areas because of their beauty and/or potential value for recreation. These areas, identified in Figure II.E-5 and Table II.E-2, need careful monitoring and conservation. Public acquisition is the only way to ensure their preservation and proper use. Many of the County's resource areas have been developed as regional parks (see discussion below).

Regional Parks and Recreation Areas. The regional parks in San Joaquin County (see Figure II.E-6) are those which are intended to serve people from more than one community. The County owns and/or operates more than half of these parks (see Table II.E-3). The parks attract the people of the region because of their settings and types of activities available. Most regional parks which provide a variety of activities are more than 100 acres. Size, however, is dependent on the function of the park. A fishing access area, for example, might be smaller than two acres.

Figure II.E-4 BORROW AREAS

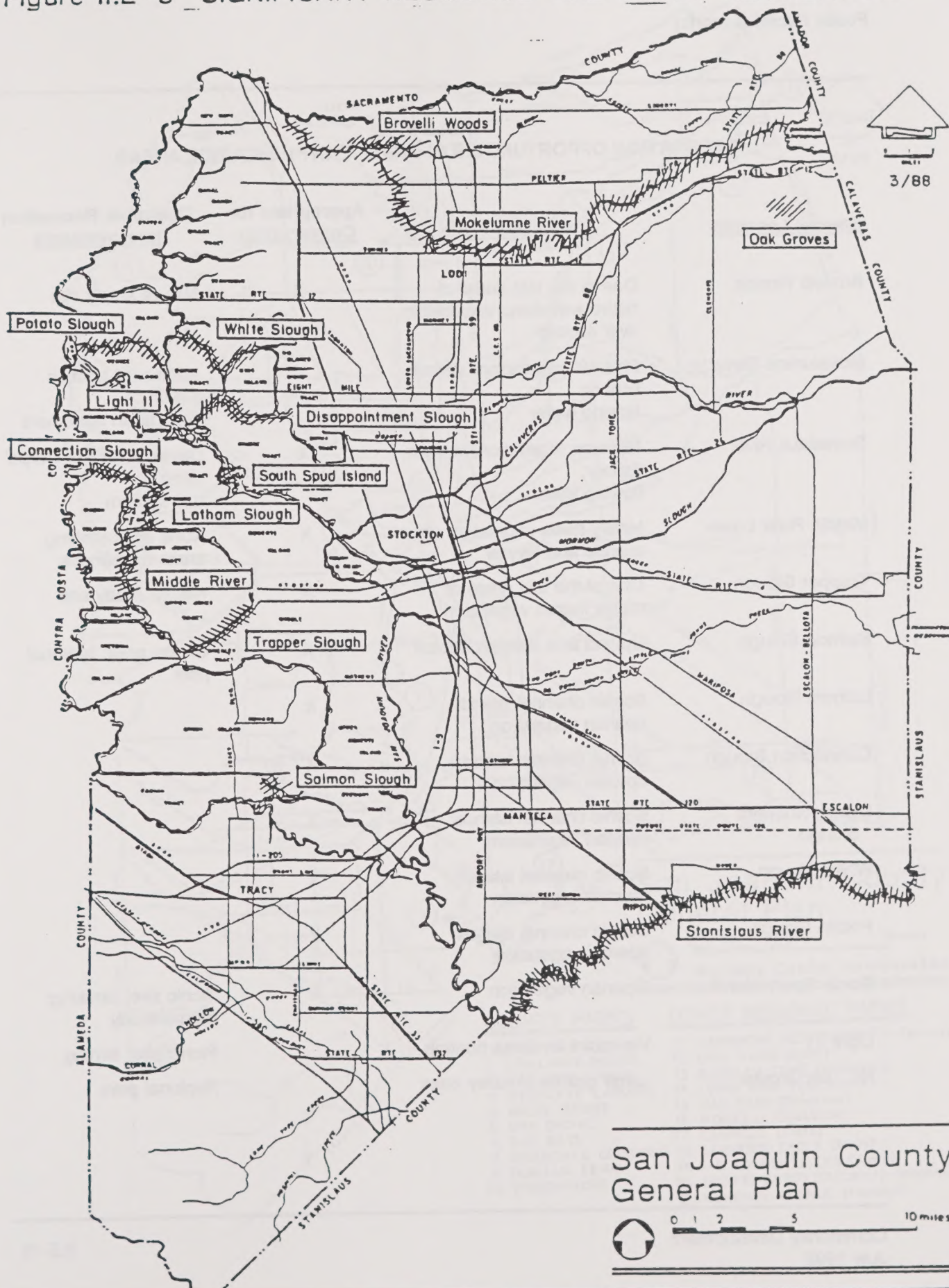


San Joaquin County
General Plan



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Figure II.E-5 SIGNIFICANT RESOURCE AREAS FOR RECREATION



**TABLE II.E-2
RECREATION OPPORTUNITIES IN SIGNIFICANT RESOURCE AREAS**

<u>Special Location</u>	<u>Future Use Value</u>	<u>Appropriate for Conservation</u>	<u>Desirable Recreation Improvements</u>
Brovelli Woods	One of the last areas of native woodland vegetation; river access	X	Nature study site
Mokelumne River	Riparian vegetation; stream fishery; flowing water	X	Additional access areas; vegetation easement
Stanislaus River	Riparian vegetation; stream fishery; flowing water	X	Development of Corps' sites; trail system
Middle River Lower	Heavy levee vegetation on islands and levees	X	None or launching areas for canoes
Trapper Slough	One of the last areas of native marsh vegetation	X	Nature study site
Salmon Slough	Upland and riparian habitat	X	Canoe area; regional park
Latham Slough	Scenic channel islands; riparian vegetation	X	
Connection Slough	Scenic channel islands; riparian vegetation	X	
Disappointment Slough	Scenic channel islands; riparian vegetation	X	
White Slough	Scenic channel islands; riparian vegetation	X	
Potato Slough	Scenic channel islands; riparian vegetation	X	
South Spud Island	Riparian vegetation	X	Picnic site; docking; nature study
Light 11	Viewpoint for Delta boating		Picnic site; fishing
NE Oak Groves	Large groves of valley oaks		Regional park

Figure II.E-6 REGIONAL USE PARKS

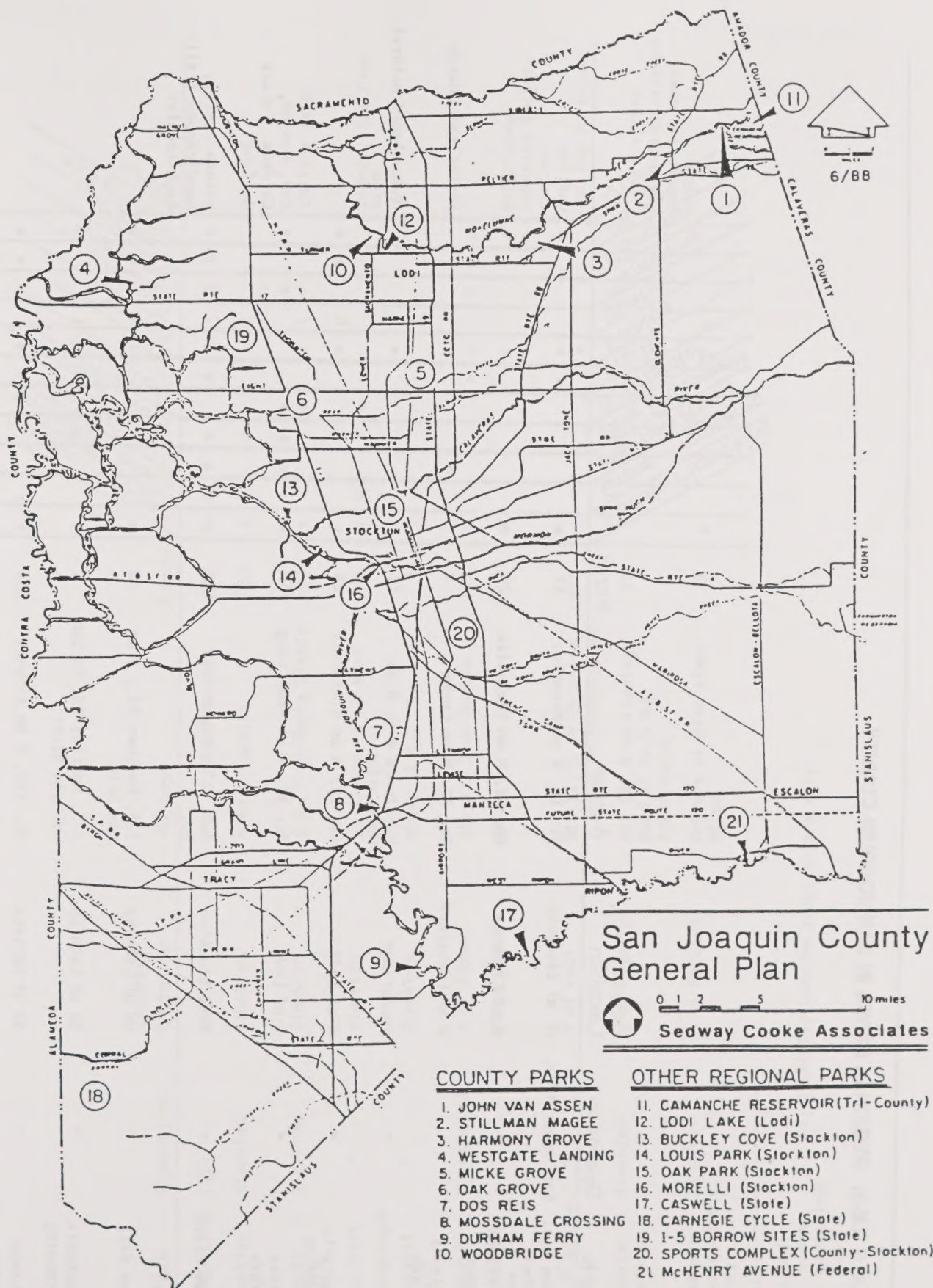


TABLE II.E-3: REGIONAL PARKS IN SAN JOAQUIN COUNTY

Park	Operation	General Location	Access	Acres	Family Picnicking	Group Picnicking	Meeting Room	Play Equipment	Ballfield(s)	Trails	Fishing	Boating	Swimming	Camping	Parking Fee	Other
John Van Arden	San Joaquin Co.	NE of Clements	Rt. 12, N on McIntire	47	•				•	•						Rafting
Stillman Hugo	"	N of Clements	Rt. 12, N on Hackville	20	•					•						"
Harmony Grove	"	W of Lockeford	Rt. 12, W on Locke	1		•										Historical Church
Woodbridge	"	Woodbridge	Hokelumne Ave, N on Meadowlark	15						•						Undeveloped natural area
Westgate Landing	"	W of Lodi	Rt. 12, N on Glasscock	25	•					•	D		•	•		
Hicks Grove	"	S of Lodi	Rt. 99, W on Armstrong	259	•	•	•	•	•			•		•		Zoo, Museum, Gardens. Future Golfing
Oak Grove	"	N of Stockton	I-5, E on Eight Mile Rd.	180	•	•	•	•	•	•			(1)	•		Nature Center, Handicapped Trail, Amphitheater
Dos Reis	"	NW of Lathrop	I-5, Hanthay Rd., W on Dos Reis	10	•					•	L		•	•		
Monodale Crossing	"	SW of Lathrop	I-5, Hanthay Rd. to San Joaquin River	4	•		•			•	L			•		
Durham Ferry	"	SW of Manteca	Rt. 120, S on Airport	207	F	F			•	•			•	•		
Comanche Reservoir	Comanche Park District	NE of Clements	Rt. 88, E on Liberty	259	•					•	DL	•	•	•		Tri-County Area. Development on

TABLE II.E-3: REGIONAL PARKS IN SAN JOAQUIN COUNTY (CONTINUED)

Park	Operation	General Location	Access	Acres	Family Picnicking	Group Picnicking	Meeting Room	Play Equipment	Ballfield(s)	Trails	Fishing	Boating	Swimming	Camping	Parking Fee	Other
Lodi Lake	Lodi	Lodi	Rt. 99, W on Turner	143	•			•	•	•	L	•	•	•		
Buckley Cove	Stockton	Stockton	W on Brookside	53	•		•		•		L					
Louis Park	Stockton	Stockton	I-5, W on Monte Diablo	71	•		•	•	•		L					Child's park
Oak Park	"	Stockton	On Alpine, W of West Lane	61	•	•	•	•								Tennis, Ice Rink
Murrell Park	"	Stockton	Weber at I-5	4							L					
Caoswell	State of CA	S of Ripon	Rt. 99, S on Austin	258	•				•	•		•	•	•		
Carnegie OHV	"	SW of Tracy	SW on Corral Hollow	1500	•								•	•		Off-Highway Vehicles (motor-cycles)
I-5 Burrow Sites	"	W of Lodi	Rt. 12, S on Thornton, W and N on Frontage Rd.	683					•							Hunting in season
Sports Complex	Stockton	S of Stockton	Rt. 99, S on Frontage Road at Arch Rd. Interchange	53				•								Future soccer fields and related commercial development
McHenry Recreation Area	Federal	S of Escalon	McHenry at Stanislaus River	75	•				•	•						

Legend:

D Docks
L Launching
F Future

(1) Youth Day Camp by reservations only

The location of most of the regional parks was determined on the basis of a significant natural feature, such as the oak groves at Micke Grove and Oak Grove parks. Many parks are associated with rivers, and 14 of the 20 regional parks provide for water activities.

The most popular activity at the parks is picnicking. The available activities and the peace and beauty are the most frequently cited reasons for liking the County's parks.⁵ As the County grows, the recreation opportunities and space must also grow or overcrowding of the existing facilities will diminish the park experience. The regional parks owned and/or operated by San Joaquin County are described briefly below. The number identifying each park is keyed to Figure II.E-6.

1. **John Van Assen Park.** This park, at the base of Camanche Dam on the Mokelumne River, provides access for fishing and for floating the river. Developed as a County park on 47 acres of land leased from the East Bay Municipal Utility District, the park is now operated by the district.
2. **Stillman L. Magee Park.** This Mokelumne River park, located on Mackville Road north of Clements, provides a bank fishing area and is the most popular access point for river rafters. A shuttle bus to transport rafters between Van Assen and Magee Parks would be useful.
3. **Harmony Grove Church.** This County-owned historical structure in Lockeford is available for weddings and other special events.
4. **Westgate Landing.** Located in the Delta, this waterside park on the South Fork of the Mokelumne River has berths, a fishing pier and picnic facilities. A campground is being developed.
5. **Micke Grove Park.** This is the most used and best known park in the County.⁵ A beautiful oak grove covers most of the developed 65 acres of the 259-acre site. The park also contains a zoo; the County Historical museum; a multipurpose meeting building; Japanese, rose, and camellia gardens; and large group picnic facilities. A trail for the blind has been constructed on the museum grounds. Plans call for the enlargement of the zoo and the development of an 18-hole golf course on the south side.
6. **Oak Grove Park.** A large oak grove and trails through a natural area provide the opportunity for nature study at this park. Along with family and group picnic facilities, the park contains the Oaks Nature Center, a 500 seat outdoor amphitheater, and a 10-acre lake for fishing.
- 7-8. **Dos Reis and Mossdale Crossing Park.** These two parks, located upstream on the San Joaquin River, feature boat launching, fishing, and picnicking. RV camping is permitted at Mossdale, and a campground has been developed at Dos Reis.
9. **Durham Ferry Recreation Area.** This 180-acre park is owned by the State of California but operated by the County. Located along the San Joaquin River, it is subject to periodic flooding.

Planned development includes RV and tent camping, an equestrian staging area, a science camp, bank fishing, and a trail system.

10. **Woodbridge Park.** Located just northwest of Lodi on the Mokelumne River, Woodbridge Park is a 15-acre, undeveloped natural area providing river access and fishing.
20. **Sports Complex.** The Sports Complex, located next to Stockton Metropolitan Airport, is owned jointly by the County and City of Stockton. The first phase contains four softball diamonds. In the future, three more softball diamonds, one hardball diamond, six soccer fields, camping, exercise course, picnic area, and concessionaire area are planned.

Local Parks. Local parks are public recreation areas which serve a community, neighborhood, or smaller area. Local parks are designed for convenient access. These types of parks may be provided by a city or, if an urban community is unincorporated, by the County or by a special district. Parks used by local residents may also include nearby regional parks, trails, bikeways, and nature areas.

Local parks are usually categorized as mini-parks, neighborhood parks, and community parks. Mini-parks also called "vest-pocket" parks, include playlots and other recreational facilities serving an area less than a neighborhood in size. Neighborhood parks usually range in size from 5 to 15 acres, and are generally within walking distance of one's home. Neighborhood parks are areas for concentrated recreational activities for all age groups. They may contain areas for court and field sports and picnicking. Schools, with their playing fields, can often augment the recreation area of adjacent parks.

Community parks serve larger areas and populations than neighborhood parks, and often provide special facilities such as swimming pools, tennis courts, and community centers. These parks generally have diverse activities, including areas not only for localized sports but also for walking and jogging. Community parks should be within bicycling distance of one's home and served by a major street.

In the unincorporated area of San Joaquin County, there are two community parks, nine neighborhood parks, and one mini-park (see Table II.E-4). Victor is the only smaller community with a park. This park, Parkins Park, is privately owned and is maintained by Lodi Unified School District, which has a school adjoining the park. In the smaller communities, recreation activities are generally provided in conjunction with the local schools.

Recreation Areas Other Than Parks. As heavily used as the County's parks are, a great deal of public recreation occurs outside the parks, in other developed areas.

School Playgrounds. School playgrounds provide an important local recreation resource, particularly in the smaller communities. It is usually efficient to site neighborhood parks adjacent to schools so that the facilities can complement each other. In order to be of maximum use, the school playgrounds need to be open during the non-school hours.

TABLE II.E-4: LOCAL PARKS IN UNINCORPORATED AREAS OF SAN JOAQUIN COUNTY

Area	Local Park	Park Type	Acres	Facilities					
				Ballfield	Picnic Area	Tot Lot	Community Center	Basketball Court	Other
Stockton	West Jackson	Mini	0.5			X			
	Boggs Tract	Neighborhood	3.0	X		X	X	X	
	Eastside	Neighborhood	10.0	X		X			
	Garden Acres	Neighborhood	8.0	X		X	X	X	
	Glanone	Neighborhood	15.0	X		X	X		
	Madison	Neighborhood	4.0	X		X			
	Taft	Neighborhood	10.9	X	X	X	X	X	
	Kennedy	Community	18.0	X	X	X	X	X	Volleyball Courts/Swimming Pool
	Diverting Canal	Unclassified	3.0						Undeveloped
Manteca	Raymus Village	Neighborhood	6.0	X	X	X		X	
Tracy	Larch Clover	Neighborhood	4.5			X	X	X	
Woodbridge	Woodbridge Tot Lot	Neighborhood	1.3						Undeveloped
Lathrop	Lathrop	Community	9.0	X	X	X	X	X	
Victor	Parkins ¹	Neighborhood	3.4	X	X				Volleyball Courts
<u>Other Areas</u>									
Morada	Morada	Neighborhood	6.0						Undeveloped

¹ Private ownership and operation.

Bikeways. Bikeways, whether on the street or separated from it, provide an important part of the recreation system. An estimated 45% of the County's households bicycle.⁵ Bikeways are discussed further in the Transportation Appendix.

Scenic Routes. Despite the high cost of gasoline, driving through the rural countryside is still a major recreation activity.⁵ Routes through the agricultural areas and along the waterways are particularly attractive. It is expected that driving will continue to be a popular form of recreation.⁹

San Joaquin County has two highways officially designated as scenic highways by the State: all of Interstate 580 through the County and a portion of I-5 (see Figure II.E-7). Although no other routes in San Joaquin County merit acceptance into the State Master Plan for Scenic Highways,¹⁰ many of the County's roads provide interesting recreational drives for local residents. Routes included in Figure II.E-7 have attractive natural amenities, interesting man-made features, or activities representative of the County.

Travelers in and through the County receive their impression of the County from its roadways. A pleasant view leaves a positive impression and can encourage a person to return, to linger, and even stay for some time. The majority of the County's scenic routes are located in agricultural areas. Little development, other than agriculture, is planned along these routes. No special regulations are necessary to protect the routes' scenic values, other than conditions that could be applied at the time of issuance of a permit for a specific development. The County does have a litter removal program that could be used along any identified scenic routes to ensure that the views from the route are not impaired.

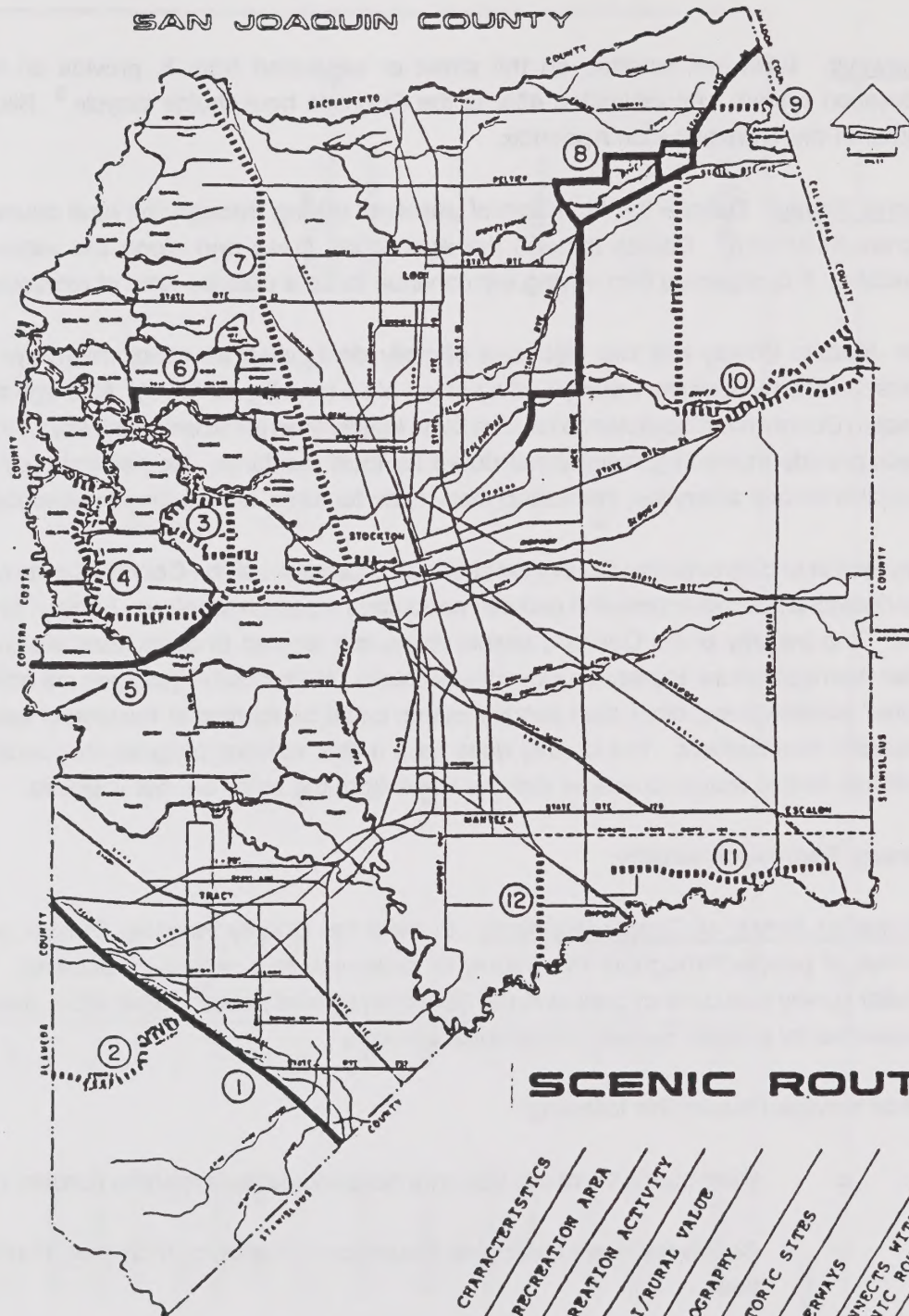
Present Recreation Activity.

Recreation Activity of County Residents. In 1980 the County Planning Division conducted telephone surveys of people throughout the County to determine their recreation activities. At the same time a smaller survey was done of people at the County's regional parks.⁵ Table II.E-5 indicates the areas most frequented for popular outdoor recreational activities.

These surveys indicate the following:

- o More than 95% of the County's households participate in outdoor recreation;
- o County residents participate in outdoor recreation on more than 40,000,000 occasions per year;
- o Picnicking is the most popular activity at parks in the County; 86% of the people surveyed participate in this activity (see Figure II.E-8);
- o Aside from picnicking, walking is by far the most popular form of outdoor recreation;

Figure II. E-7



SCENIC ROUTES

ROUTE ¹	LENGTH (MILES)	CHARACTERISTICS TO RECREATION AREA	RECREATION ACTIVITY	AGRI/RURAL VALUE	TOPOGRAPHY	HISTORIC SITES	WATERWAYS	CONNECTS WITH SCENIC ROUTES
1 I-580 & I-5	16			X	X			X
2 Corral Hollow Rd.	7	X	X	X	X			X
3 Lower Roberts Island Roads	14	X	X			X	X	
4 Bacon Island Road	13	X	X			X	X	
5 State Rte. 4	9	X				X	X	X
6 Eight Mile & Empire Tract Roads	9	X	X			X		
7 I-5	14			X			X	
8 State Rte. 88, Jack Tone & Other Roads	24	X		X		X		
9 Liberty Road	3	X		X	X			
10 Clements & Other Roads	18			X	X			
11 River Road	10	X		X				
12 Austin Road	5	X		X				

Note: Different patterns are used to distinguish between each scenic route.

TABLE II.E-5: RECREATION ACTIVITY AVAILABILITY IN SAN JOAQUIN COUNTY

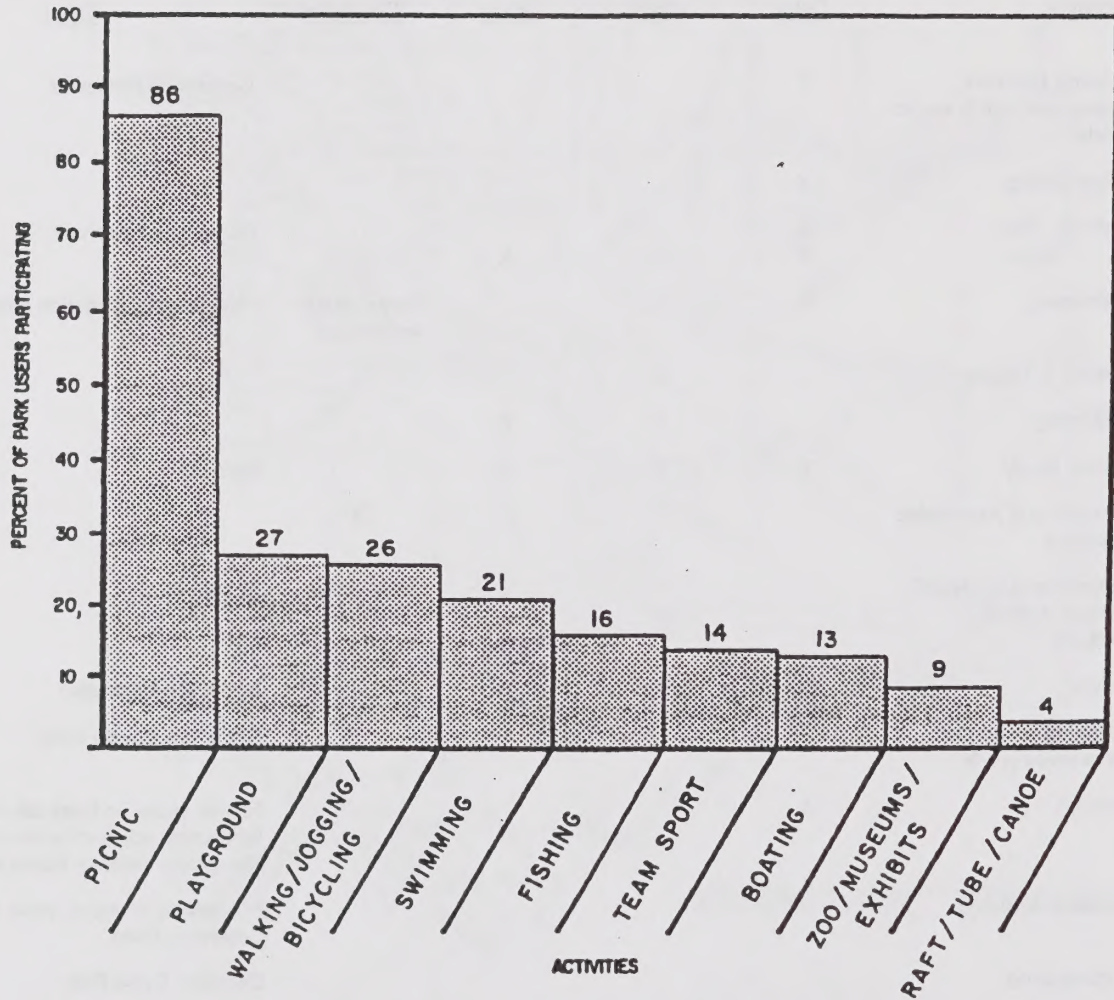
<u>Activities</u>	<u>Delta</u>	<u>Mokelumne River</u>	<u>Stanislaus River</u>	<u>County & City Parks</u>	<u>Other</u>
Boating (cruisers, houseboat, sail & speed boats)	X				Camanche Reservoir
Water Skiing	X				
Fishing: Boat	X				Camanche Reservoir
Bank	X	X	X		
Swimming	X			Some parks have pools	Private polls; irrigation canals
Rafting & Tubing		X			
Canoeing		X	X		
Nature Study	X	X	X		Farmlands
Picnicking & Associated Activities				X	
Team sports (baseball, softball, soccer, football)				Some	School Fields
Tennis					Some school courts
Camping along the Delta levee roads					Some few private areas
Hunting	X				Private clubs on Delta Islands and farmlands; adjacent to the I-5 Borrow Site ponds south of Route 12
Horseback Riding					Roadsides, diverting canal & Calaveras River
Motorcycling					Carnegie Cycle Park
Walking					Sidewalks
Jogging/Running				X	Sidewalks & parks
Biking					Roadways
Pleasure Driving	X				Rural roads

Note:

Only 10% of the miles of Delta banks used for fishing are in public control.

The "X" indicates the areas most frequented.

FIGURE II.E-8: PARTICIPATION IN ACTIVITIES AT REGIONAL PARKS



Source:

San Joaquin County Planning Division. San Joaquin County Park Use and Recreation Activity, November 1981.

- o Activities in which more than a third of the County's households participated are swimming (70% of the households), fishing (61%), pleasure driving (60%), walking (59%), boating (47%), bicycling (45%), team sports (39%) and ground or tent camping (37%) (see Table II.E-6).
- o Other activities exceeding an estimated one million participation days per year are swimming, jogging or running, pleasure driving, team sports, horseback riding, bicycling, tennis, nature study, golf, fishing, and boating (see Figure II.E-9); and

No data are available to indicate any trends in the types of recreation activity engaged in by County residents. A State report says that while there were large increases in strenuous recreation activities in the 1960s and 1970s, in the 1980s and 1990s the fastest growth is expected in non-strenuous outdoor recreation activities.¹¹

As a matter of general interest and as a point of comparison, people were asked about selected indoor recreation activities. The number and percent of households participating in each is shown in Table II.E-7.

Results of Studies of Selected Recreation Activities. Various studies have been completed and data have been compiled on several recreation activities, on which little information was previously available. Pertinent findings are summarized below.

Hunting.¹²

- o Although a 1980 survey⁵ indicated that 23% of the County's households participate in hunting, the number of hunting licenses issued to County residents is decreasing:
 - 1976 – 17,500 licenses issued to 3.3% of the population
 - 1986 – 10,704 licenses issued to 2.5% of the population;¹³
- o It is likely that decreasing habitat areas in the County has led to less hunting; and
- o A high percentage of the game taken in the County is by out-of-county residents who live within a two-hour drive.

Camping.¹⁴ In 1985 there were 19 campgrounds in the County with approximately 1,489 established sites. Of these, 739 sites had hookups for recreational vehicles (see Table II.E-8). The County has recently added 54 sites: 25 at Dos Reis, 60 at Durham Ferry, and seven at Westgate Landing. Findings from the 1978 study are summarized below:

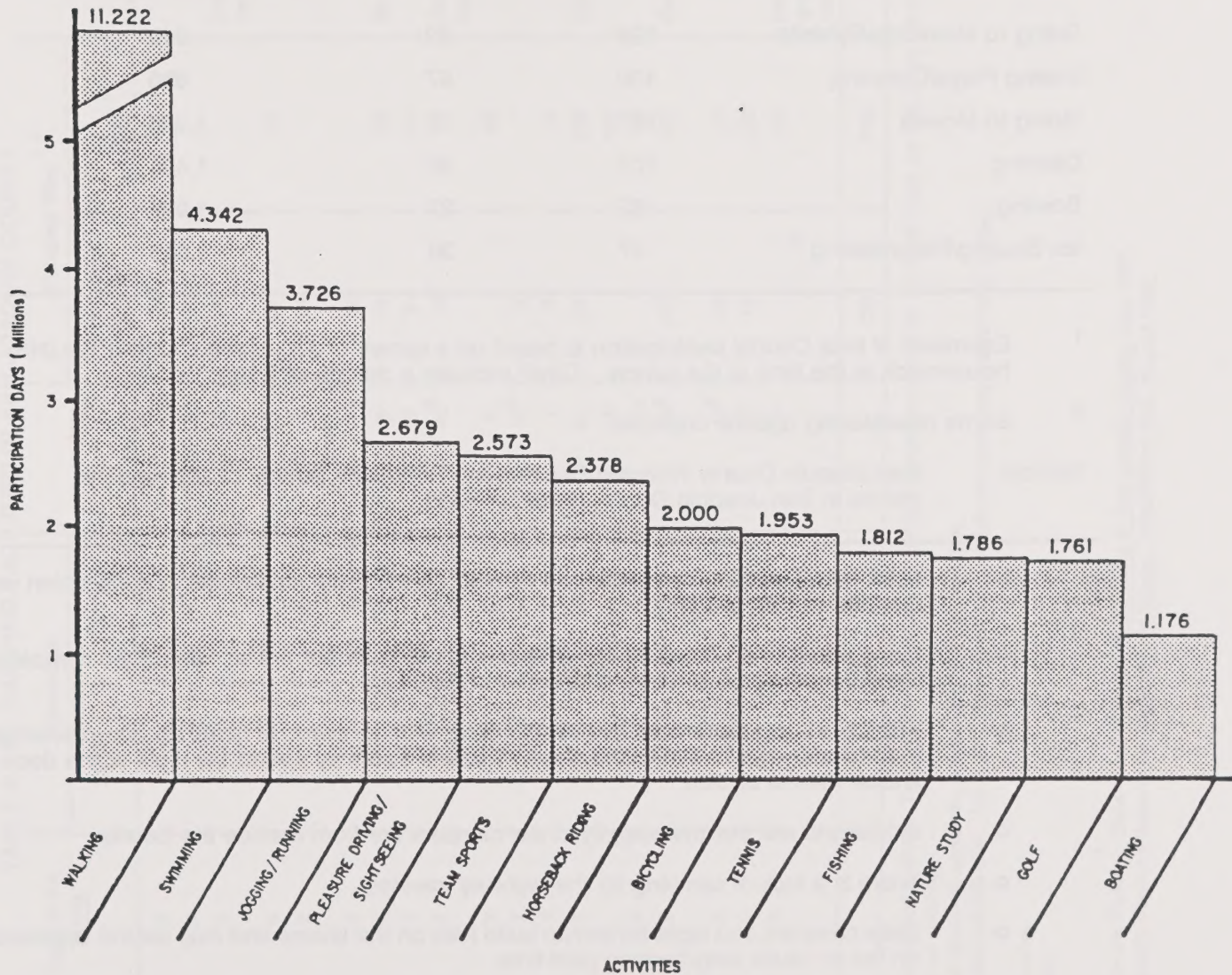
TABLE II.E-6: OUTDOOR RECREATION ACTIVITIES OF COUNTY RESIDENTS

<u>Activity</u>	<u>HOUSEHOLDS PARTICIPATING</u>		<u>Maximum Annual Participation Days by One Household</u>	<u>Mean No. of Participation Days/Year/ Household</u>
	<u>Number</u>	<u>Percent</u>		
Fishing	140	61	365	24
Boat	84	37	180	17
Bank	117	51	260	15
Rafting/Tubing/ Canoeing	66	29	52	9
Waterskiing	66	29	52	9
Boating	109	47	250	20
Swimming	161	70	365	50
RV or Other Motor Camping	55	24	52	10
Ground or Tent Camping	85	37	100	7
Tennis	71	31	365	51
Golf	46	20	724	71
Bicycling	103	45	90	36
Pleasure Driving/Sightseeing	138	60	365	36
Handball/Racquetball	34	15	240	49
Baseball or Any other Team Sport	90	39	365	53
Walking	136	59	365	153
Jogging/Running	47	20	365	147
Hiking	53	23	65	11
Nature Study	48	21	365	69
Hunting	52	23	150	15
Horseback Riding	45	19	365	90
Own	17	7	365	90
Rent	28	12	52	10
Use of Off-Road Vehicle	40	17	65	23

Source: San Joaquin County Planning Department, Telephone Survey of 230 random numbers in San Joaquin County, Summer 1980.

FIGURE II.E-9:

ESTIMATED ANNUAL PARTICIPATION IN MOST POPULAR OUTDOOR RECREATION ACTIVITIES



Source: San Joaquin County Planning Division. San Joaquin County Park Use and Recreation Activity, November 1981.

TABLE II.E-7: INDOOR RECREATION ACTIVITIES OF COUNTY RESIDENTS

<u>Activity</u>	<u>HOUSEHOLDS PARTICIPATING</u>		
	<u>Number</u>	<u>Percent</u>	<u>Annual Participating Days</u> ¹
Going to Museums/Exhibits	136	59	512
Seeing Plays/Concerts	130	57	636
Going to Movies	167	72	1,250
Dancing	105	46	1,484
Bowling	62	27	1,005
Ice Skating/Rollerskating ²	87	38	1,548

¹ Estimates of total County participation is based on a survey of 230 of the county's 124,043 households at the time of the survey. "Days" includes a portion of a day.

² Some rollerskating is done outdoors.

Source: San Joaquin County Planning Department, Telephone Survey of 230 random names in San Joaquin County, Summer 1980.

- o Most of the existing campsites are located on the Delta waterways in conjunction with marinas or County parks;
- o Many people also camp along the levees in the Delta but not at established campsites. Sanitary facilities and trash receptacles are lacking;
- o The Delta is a popular area for boat camping, with hundreds of boats anchored overnight in the waterways or tied to the shore. Boaters also may spend the night at the dock of a local marina or club;
- o Indications are that the majority of the campers are from outside the County;
- o There is a lack of camping for the highway traveler;
- o Delta campers and night fisherman build fires on the levees and may set the vegetation on fire or cause long-burning peat fires;
- o Camping demand is expected to increase;
- o The availability of campsites could attract more people to the County, to its events, and to its resources; and
- o More campsites are needed in the County, to fill both existing and future demand.

TABLE II.E-8: CAMPING FACILITIES IN SAN JOAQUIN COUNTY

<u>Campground</u>	<u>Open to the Public</u>	<u>Ownership</u>		<u>Acres</u>	<u>Camping Sites ^{1,2}</u>		<u>Comments</u>
		<u>Public</u>	<u>Private</u>		<u>Hookups for Vehicles ³</u>	<u>Tents ⁴</u>	
New Hope Landing	X		X	2±	27 ⁵	8	
Wimpy's New Hope Marina	X		X	2±	30 ⁵		
Lodi Lake Park	X	X		10	25		Group trailer & local group camping only, by reservation
Tower Park Marina	X		X	5	254	45	
Kampgrounds of America (KOA)	X		X	8	104		
King Island Traller Park	X		X	1±	16		
Tiki Lagoon Resort Marina	X		X	8	14	40	No septic hookups
Turner Cut Resort	X		X	5	30	50	
Lost Isle	X		X	52 ⁶	10 ⁷	10	Not specific sites. Access by boat only.
Windmill Cove	X		X	4+		45	
Haven Acres River Club	X		X	12 ⁶	6		
Changing Tides	X		X	1	5	3	
Turtle Beach	X		X	31	27	108	Expansion planned.
Tracy Wildlife Assn., Inc.			X	8		100	
Tracy Oasis Marina	X		X	1±		10	
Oakwood Lake Camp Resort	X		X	36 ⁶	160	160	Expansion planned.
Islander Marina	X		X	14 ⁶	20	20	
Indian Valley Resort	X		X	13	11	108	
Caswell Memorial State Park	X	X		250		65	Includes 5 ac. for 50 person group camping. Overflow camping for night only.
TOTAL SITES					739	750	

- 1 These include only acknowledged facilities. There are several resorts with ad-hoc campsites created on demand; there are also many other areas, such as roadsides, that are used extensively for camping.
- 2 Some sites have not been approved under the provisions of the Planning Title.
- 3 Mobilehome parks may also provide sites. Up to 10% of the spaces in mobilehome parks may be for travel trailers.
- 4 May use vehicle sites.
- 5 May include mobilehome sites.
- 6 Total acres in development.
- 7 Boats.

Source: San Joaquin County Planning Department, A Report on Camping in San Joaquin County, May 1987.
San Joaquin County Planning Department, Campground Survey, unpublished data, August 1982.

Bank Fishing.⁶

- Fifty-one percent of all County households fish from banks;⁵
- People like to park as close as possible to where they are fishing;
- Camping along the levees in conjunction with fishing is very popular;
- Bank fishing sites are selected because of their accessibility and the prospect of good fishing;
- Shade trees, cleared areas, gradual slopes, and a pullout for parking are desirable for bank fishing sites;
- The major problems of those bank fishing are interference by boaters and waterskiers and the lack of adequate places to go;
- More than three-fourths (77%) of those fishing said that they would use a public bank fishing area;
- Most of those fishing believed that the levees were public property; and
- The following have been identified as bank fishing needs:
 - more access, particularly in the Delta;
 - safe camping areas along the water;
 - locations and/or facilities to handle litter, lavatories and parking; and
 - fishing piers usable by the handicapped.

Boating.¹⁵

- Between 1976 and 1980 the number of boats kept in San Joaquin County increased by more than 30% (17,000 in 1967-77 to 22,820 as of October 1, 1980);^{15,16}
- In 1980, 65% of the County's boats were outboards, 13% inboard-outboard, 9% inboard, 5% handpowered, 3% sailboats, and 2% jet boats;¹⁶
- The number of boats registered to County residents is growing faster than the population, increasing 32% between 1980 and 1987, to 19,127 boats;¹⁷
- In 1986-87 the County collected \$801,299 in taxes on boats;¹⁸
- Forty-seven percent of all County households boat; 37% fish from a boat; and 29% waterski;⁵

- An estimated 1,176,000 annual participation days are spent by County residents boating;⁵
- Nearly 400 miles of the County's waterways are used for boating;
- Boaters from other counties account for probably two-thirds of the boating in the County's portion of the Delta;⁵
- Waterways are environmentally sensitive; improper development can harm them and decrease their attractiveness or usefulness for boaters;⁵ and
- Waterway development and regulation occur on a piecemeal basis.⁵

Recreation Demand. The extent of recreation demand is difficult to determine. However, the following are known:

- Regional parks are often overcrowded in summer;
- People wait for use of some facilities such as ball diamonds;
- More picnic shelters, ball diamonds, and soccer fields are needed;
- It is difficult to find a swimming beach or tie-up area in the Delta;
- Many people are still not aware of the County's recreation opportunities; and
- In an effort to get away from others, people trespass onto private land.

Recreation surveys taken in 1977-1980 all show large numbers of non-residents using the County's recreation areas, particularly those in the Delta (see Table II.E-9 and Figure II.E-10). Approximately 16% of the recreationists in the entire Delta are from the County. San Joaquin County contains 47% of the Delta, with some of the most beautiful waterways for boating.

TABLE II.E-9: NON-RESIDENT RECREATIONISTS

	<u>County Residents</u>	<u>Non-Residents</u>
1980 County Park Survey ¹	64%	36%
1980 Survey of Three Delta Parks ¹	50%	50%
1977-79 Delta Survey ²	35%	65%
1977 Delta Bank Fishing Survey ³	40%	60%
1977 Delta Launching Ramp Survey ⁴	34%	66%

¹ San Joaquin County, Planning Department, Park Use Surveys, November 1981.

² State of California, Department of Water Resources, Delta Outdoor Recreation Implementation Plan, June 1981.

³ San Joaquin County, Planning Department, Fishing Report, April 1978.

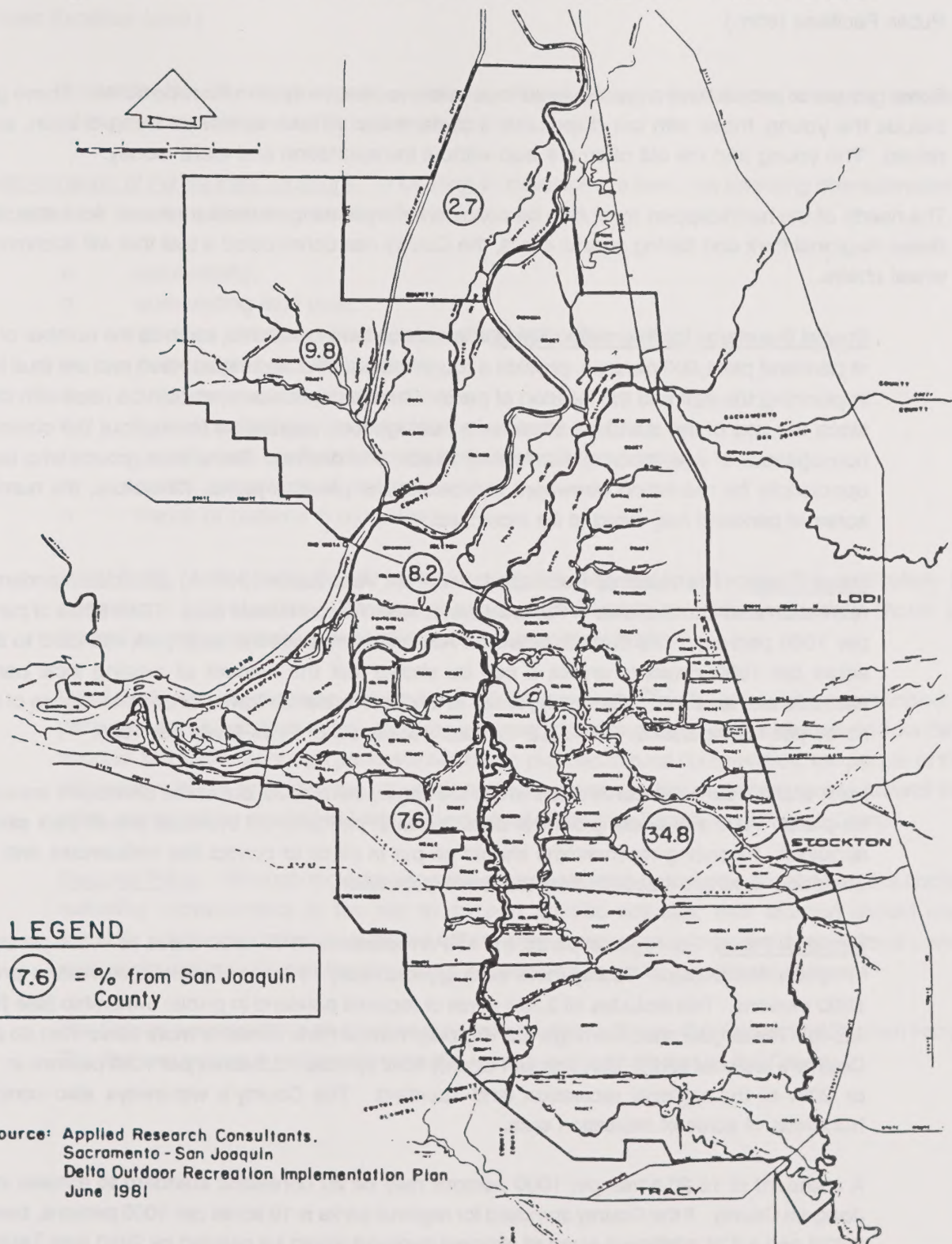
⁴ San Joaquin County, Planning Department, Boating Report, July 1979.

Existing Deficiencies. The existing deficiencies in fishing access sites, campgrounds, and hunting areas have been identified above. In addition to these, a major deficiency in the recreation system is the lack of trails for hikers, cyclists, and horseback riders. A few trails exist in parks, and the City of Stockton has a bicycle trail along the Calaveras River. There are equestrian trails at Durham Ferry Park. In selected locations, the levees along the waterways are ideal locations for trails. Problems can arise with public access to levees where it is not policed. The problems include trespass, vandalism, and trash. Additionally, improvements placed on the levees may occasionally be damaged during levee repairs.

The County also lacks specified areas for nature study. Viewing towers would be useful on some of the Delta's tule islands. Parking areas adjacent to the County's wildlife preservation areas are also needed. Another deficiency somewhat related to recreation, is the lack of emphasis on historic sites and structures. The County maintains only one historic structure (see the Historic Preservation Appendix for further discussion).

Future Needs. As users of the recreation system change, the system must be flexible enough to accommodate the change. During the General Plan planning period there will be an increase in the median age and an increase in the proportionate numbers of Hispanic and Asians in the population. Decreases in personal space and personal recreation facilities are also expected as the County's population becomes more urbanized. These changes must be monitored and taken into account in the planning for recreation.

Figure II.E-10 PERCENT OF DELTA VISITORS



LEGEND

(7.6) = % from San Joaquin County

Source: Applied Research Consultants.
Sacramento - San Joaquin
Delta Outdoor Recreation Implementation Plan
June 1981

San Joaquin County
General Plan



Some groups of people have a greater need for a public recreation system than do others. These groups include the young, those with low disposable income, those without access to transportation, and the retired. The young and the old often are also without transportation and extra money.

The needs of the handicapped must also be considered in planning recreation areas. As a start, in Oak Grove Regional Park and fishing access areas, the County has constructed a trail that will accommodate wheel chairs.

Spatial Standards for Recreation Areas. Recreation land standards, such as the number of acres of parkland per 1,000 persons, provide a rough indication of recreation need and are thus helpful in planning the size and the location of parks. Standards, however, should be used with caution since the use of the standard assumes a homogenous population throughout the community: homogenous in age, income, distribution, needs, and desires. Some user groups who lack the opportunity for recreation elsewhere can be heavier users of parks. Therefore, the number of acres of parkland may need to be increased.

Local Parks. The National Recreation and Park Association (NRPA) provides standards for recreation land and facilities.¹⁹ For local parks, NRPA recommends 6.25 - 10.50 acres of parkland per 1000 persons. The State Subdivision Act, however, limits the local park standard to three acres per 1000 persons, unless it can be shown that the amount of existing local parkland exceeds that amount.²⁰ Generally, areas in the County do not have parkland in excess of three acres per 1000 persons. Table II.E-10 uses a standard of three acres per 1000.

Most of the local parks serve areas which are largely developed, but some developed areas have no parks. As these areas grow, the deficiencies in parkland will increase unless park sites are acquired. Financing mechanisms should be put in place to correct the deficiencies and allow additional land to be acquired for the future population.

Regional Parks. For regional parks, the NRPA recommends 15 to 20 acres per 1000 persons.¹⁹ In 1980 in San Joaquin County there were approximately 11 acres of regional recreation land per 1000 persons. This includes all 3,928 acres of regional parkland in public ownership (see Figure II.E-6). The largest area, Carnegie Off-Highway Vehicle Park, contains more acres than do all the County's regional parks. San Joaquin County itself operated 2.2 acres per 1000 persons in 1980, or 20% of the regional recreation land standard. The County's waterways also contribute hundreds of acres of recreation area.

A standard of 15-20 acres per 1000 persons may be an unrealistic standard to achieve in San Joaquin County. If the County standard for regional parks is 10 acres per 1000 persons, between 3,572 and 4,372 additional acres of regional parkland would be needed by 2010 (see Table II.E-11). Although this is an 84% increase over the existing amount, it does not seem to be

unreasonable. The regional parks are serving many out-of-county residents and even now many of the parks are beginning to be crowded.

Determination of Future Park Locations. In locating or developing a park, the following characteristics of the area and the users must be considered.

- o accessibility;
- o surrounding land uses;
- o distance and time from population and from other parks;
- o demographic profiles of users;
- o socio-economic factors of users;
- o cultural and ethnic characteristics of users;
- o quantity and quality of existing facilities, including private;
- o needs and desires of population; and
- o trends or patterns in recreation.

Local Parks. Local parks should be spaced so that they are easily accessible, particularly by pedestrians and bicyclists. Because they will also attract automobile traffic, they should be located on major collectors or roadways of a higher classification.

Local parks are needed as a service in urban communities. In planned urban communities, a park should be established by the time an operational authority is established and funding sources identified. Although parks are not being planned in rural communities, the people of the area may wish to establish one. In addition to new parks in the urbanizing areas around the cities, parks will be needed in Lathrop, Lockeford, Thornton, Linden, and French Camp.

Regional Parks. Although regional parks are more likely to be based on natural resources and/or suitability characteristics of the site to support specific activities, their location should also consider where the potential users live. Park user surveys have indicated that regional parks receive proportionately heavier use from the communities which are closest to them.⁵

The County operates three multi-use regional parks: Micke Grove, Oak Grove, and Durham Ferry. The first two are north of Stockton and the third is in the south part of the County.

**Table II.E-10
CRITERIA FOR PARK DEVELOPMENT**

Park Type	Approximate Size (Acres)	Recreational Use	Service Area Radius	Access Requirements	Acres/1,000 Population
Regional Park	15-200	Nature-oriented outdoor recreation picnicking, boating, fishing, camping, trail uses and play areas.	1 hour drive time; serving several communities	Arterial and bicycle access	10
Local Parks					3
Community Park	15+	Intense recreation facilities, athletic fields & complex, swimming pools, picnicking, and play areas.	1 mile	Arterials or Collector, and bike and pedestrian access	
Neighborhood Park	Less than 15	Intense recreation activities, field games, court games, crafts, playground apparatus, picnicking, etc.	0.5 mile	Any roadway, and bicycle and pedestrian access	
Mini Park	1 or less	Specialized use facilities for special user groups (tots, seniors,) nature or historic information marker, etc.	0.25 mile or less	Any roadway, and bicycle and pedestrian access	

TABLE II.E-10: CRITERIA FOR PARK DEVELOPMENT

TABLE II.E-11: ESTIMATED NEED FOR REGIONAL PARKLAND

<u>Year</u>	<u>Population</u>	<u>Land Needed to Provide 10 Ac/100</u>	<u>Surplus/Deficit Compared to Existing Acreage ¹</u>
1980 ²	347,342	3,473	455
1990 ³	480,628	4,806	(878)
2010 ⁴	750,000 - 830,000	7,500 - 8,300	(3,572) - (4,372)

¹ Existing 3,928 acres.

² U. S. Census Bureau, 1980 Census, April 1980.

³ U. S. Census Bureau, 1990 Census, April 1990.

⁴ Based on California Department of Finance, Population Projections, April 1991; and Economic and Planning Systems, Growth Forecast for San Joaquin County, October 1991.

Additional regional park sites will also be needed during the General Plan planning period and are identified below:

1. Tom Paine Slough: The County General Plan has designated this area for recreation for many years. At one time it was considered for acquisition as a State park. The area includes agricultural land, waterways, and channel islands. Located east of Tracy Boulevard, it could have water access at Old River or Salmon Slough. With the population growth in the southeast County, acquisition of this site should be a priority.
2. Black Slough Landing: This site is located on the south side of the Stockton Deepwater Channel, at the north end of Holt Road, north of State Route 4. Access is good from Stockton and the Tracy area. The location permits views of the boating activity on the Channel. Bank fishing and camping are also common in this area. If development were to include berthing, it should be off-channel.
3. Southeast County Site: A site in the southeast portion of the County would serve the residents of Manteca, Ripon, and Escalon. Further study needs to be done on an appropriate area.
4. Northeast Oak Grove: The area south of Clements, near Acampo and Johnson Roads, contains several oak groves. These could provide the setting for a regional park.

Development would be appropriate later in the planning period, when the population of the northeast portion has increased.

Delta Facilities. As part of a proposed Delta levee rehabilitation program, the Corps of Engineers and the State Department of Water Resources recommended creation of 45 recreation sites throughout the Delta, with 27 located on 340+ acres in San Joaquin County: 8 recreation areas, 15 fishing access sites, and 4 boater destination sites (see Figure II.E-11). 21,22 Trails are also proposed as part of the levee program. Cost of development, operation, and maintenance would be shared by all those agencies which benefit from the levee project. In 1982 the first cost of the levee rehabilitation project was estimated at \$415,000,000 (\$40,566,000 for recreation), with annual costs of \$28,000,000 (\$4,035,000 for recreation).

It is likely that the rehabilitation plan will be substantively changed before it is begun. Therefore, it appears too early to recommend that all of the recreation sites proposed are appropriate. A thorough local analysis needs to be done, not only of the sites in Figure II.E-11, but more especially of the recommended trail system.²¹

It is important, however, that the County fully support the inclusion of recreation areas in any levee rehabilitation program, with funding for operation and maintenance. These sites would address deficiencies in the County's existing recreation system. They would provide fishing, picnicking, camping, hiking, canoeing, nature study, and boat launching.

Trails. To begin to address the need in the County for a trail system, various trails for hikers, cyclists, equestrians, and canoers are planned:

- o Mokelumne River Levee Trail
- o Mokelumne River Canoe Trail
- o Stanislaus/San Joaquin Levee Trail
- o Stanislaus Canoe Trail
- o Paradise Cut Canoe Trail
- o Middle River Canoe Trail

The possibility of using the East Bay Municipal Utility District right-of-way for a trail system should also be investigated. Trails would also be part of a Delta levee rehabilitation program, as noted above.

Financing Recreation. Financing is the biggest problem in providing recreation areas. The passage of Propositions 13 and 4 have resulted in limitations on General Fund monies, and federal funds for

PROPOSED FOR DELTA LEVEE REHABILITATION PROGRAM



Public Facilities (cont.)

recreation have decreased. The federal Land and Water Conservation Fund has decreased 88% in the State in the 10 years prior to 1986. Not only must sites be acquired, they must be developed and then operated and maintained.

There are various methods to achieve the recreation needs in the County. One method is to convince other agencies to locate recreation areas here. State and federal areas serve as facilities for the County's residents. In some cases, recreation areas are created to mitigate impacts created by development projects. For example, the Corps of Engineers' sites along the Stanislaus River are mitigation measures for the construction of New Melones Reservoir. Most recreation areas in the Delta need to be created as part of Delta levee rehabilitation program. The County has been very successful at getting grants from the State to purchase land and develop its regional parks. The continuation of grant money, however, is dependent on the passage of bond acts and other factors.

On the local park level the County has used Quimby Act monies. The State legislation known as the Quimby Act enables the County to require the dedication of parkland or the payment of in lieu fees for parks to serve a subdivision.²⁰ A difficulty with this method of financing is that the amounts of money collected from each new subdivision are relatively small and the bookkeeping required is costly. In addition, the monies can be used only for developing new or rehabilitating existing parks or facilities. Use of the monies for operation is not possible.

Other agencies operate facilities at the County's local parks. At the regional parks the County has used volunteers as well as rangers for operation. The County has also been successful in promoting donations for the parks. Entrance fees help off-set some of the operation costs. The fee for park entrance, however, should not prohibit park use.

Other means to fund recreation need to be explored. The County is considering the possibility of using benefit assessment districts to fund local parks. These districts could be limited to individual communities, or a County-wide district could be formed. A commitment of staff time will be necessary to form districts. Private-public partnerships have been used successfully in other jurisdictions and may be an opportunity worth exploring.

Endnotes

1. San Joaquin County Planning Department. A Report and Calculations on the Number of Miles of San Joaquin County Waterways. September 1977.
2. San Joaquin County Council of Governments. Conservation Element. July 1973.
3. State of California, Department of Water Resources. Sacramento-San Joaquin Delta Outdoor Recreation Implementation Plan. Prepared by Applied Research Consultants, Inc. June 1981.
4. State of California, Department of Water Resources. Sacramento-San Joaquin Delta Outdoor Recreation Survey. Prepared by Cajucum, Edilberto Z. and Associates. March 1980.
5. San Joaquin County Planning Department. San Joaquin County Park Use and Recreation Activity: Results of Two 1980 Surveys. November 1981.
6. San Joaquin county Parks and Recreation Department. A Report on Fishing in San Joaquin County. April 1978.
7. San Joaquin County Parks and Recreation Department. Monthly Attendance Reports, 1980-1987.
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9. State of California, Department of Parks and Recreation. California Outdoor Recreation Plan - 1988, Draft. February 1988.
10. State of California, Department of Public Works. California Scenic Highway System, Master Plan of State Highways Eligible for Official Scenic Highway Designation. 1963.
11. State of California, Department of Parks and Recreation. Recreation Needs in California. 1982.
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13. State of California, Department of Fish and Game. Personal communication. February 24, 1988.
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15. San Joaquin County Planning Department. A Report on Boating in San Joaquin County. July 1979.
16. San Joaquin County Assessor's Office. Personal communication. October 15, 1981.
17. State of California, Department of Motor Vehicles, Budget Office. Personal communication. February 1988.
18. San Joaquin County Assessor's Office. Personal communication. February 1988.
19. National Recreation and Park Association. Recreation, Park and Open Space Standards and Guidelines. 1983.
20. State of California, Government Code, Section 66477.
21. U.S. Army Corps of Engineers. Sacramento-San Joaquin Delta California, Draft Feasibility Report and Draft Environmental Impact Statement. October 1982.
22. State of California, Department of Water Resources. Delta Levees Investigation. December 1982.

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1. San Joaquin County Planning Department. Inventory of San Joaquin County Recreational Facilities. April 1978.
2. _____. Identification of Potential Recreational Sites in San Joaquin County. June 1978.
3. _____. Recreation Standards. March 1978.
4. _____. Local Parks in San Joaquin County. November 1977.
5. _____. Analysis of Local Park Service Areas. May 1978.
6. State of California, Department of Water Resources. Sacramento-San Joaquin Delta Recreation Concept Plan. Prepared by Marcia A. Geidel and Susan J. Moore. June 1981.
7. California Resources Agency. Delta Master Recreation Plan. September 1976.
8. Delta Advisory Planning Council. Delta Action Plan. July 1976.

9. State of California, Department of Fish and Game, and U.S. Fish & Wildlife Service. Sacramento-San Joaquin Delta Wildlife Habitat Protection & Restoration Plan. December 1980.
10. State of California, Office of Planning and Research. Planning for the Fun of it: How to Prepare a Recreation Element for a General Plan. July 1982.
11. San Joaquin County Planning Department. Draft Scenic Highways Element. April 1978.
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15. State of California, Department of Parks and Recreation. Recreation Activity in California. Executive Summary. Prepared by Center for Continuing Study of the County Economy. Palo Alto, Ca. 1982.
16. San Joaquin County. Recreation Element. June 1966, as amended.

2. EDUCATIONAL FACILITIES

Educational facilities within San Joaquin County include public and private elementary and secondary schools, colleges and a university. Special education, continuation schools and adult education, as well as business, vocational, and technical training are also available.

School Facilities.

Public School Systems. Seven unified school districts (Grades K-12) in the County serve approximately 90% of the public school population. The remaining 10% are served by elementary school districts and joint union high school districts. The seven unified school districts include Escalon, Lincoln, Linden, Lodi, Manteca, Ripon, and Stockton. Seven elementary school districts (K-8) are within the Tracy Joint Union High School district (9-12), which also serves one elementary district from Alameda County. Three elementary school districts in the north County area are within the Galt Joint Union High School District (Sacramento County), while a small area in the southeastern portion of the County is within the Valley Home Joint School District (Stanislaus County). Figure II.E-12 shows school district boundaries.

Private Schools. Private school enrollment within San Joaquin County is predominately church-affiliated and accounts for approximately 9.5% of the total elementary and secondary (K-12) enrollment in the County.¹ The percentage of students enrolled in private schools in the County has remained stable over recent years (see Table II.E-12). This percentage is only slightly below the statewide figure of approximately 11%.¹

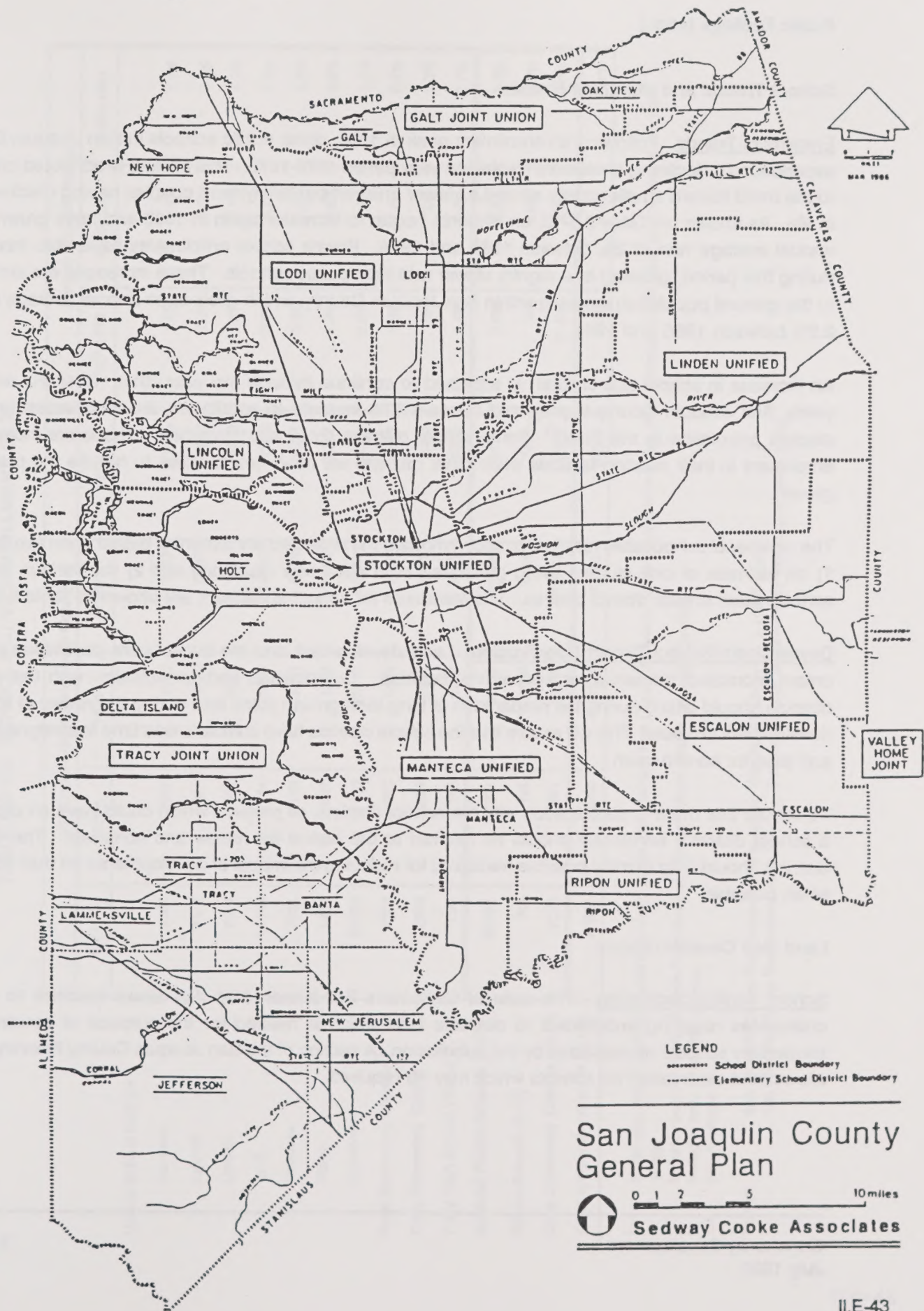
While many private schools have limited enrollment (some by design), several can claim enrollments equivalent to public elementary and secondary schools. Enrollments range from one student being taught in a home to enrollments of over a thousand.²

Higher Education. Stockton is the location for two major institutions of higher learning, San Joaquin Delta Community College and the University of the Pacific (UOP). Delta is a two-year public community college which serves all of the school districts in San Joaquin County except the Ripon Unified school district which is served by the Modesto Community College District. Delta also serves Galt Joint Union High School District and River Delta Unified in Sacramento and Solano counties, respectively.

The University of the Pacific (UOP) is a private university with undergraduate and graduate programs in several schools and colleges including business and public administration, music, education, engineering and pharmacy. Separate campuses for dentistry and law are located in San Francisco and Sacramento, respectively.

Additional collegiate programs are provided by Stanislaus State College and the University of San Francisco, which hold classes on the Delta Community College campus, and by a variety of private business, vocational, and technical schools located in the Stockton vicinity.

Figure II.E-12 SCHOOL DISTRICTS



School Trends and Identified Needs.

Enrollment Trends. Following an enrollment peak in 1969, some public schools in San Joaquin County experienced a declining enrollment for the ten year period 1970-1979. This decline is attributed primarily to the trend toward smaller family sizes (i.e., fewer children per family) and couples having children later in life. As shown on Table II.E-12, enrollments began to increase again in 1980 and have grown at an annual average rate of 3% between 1980 and 1984. Private school enrollments have also increased during this period, growing at a slightly slower rate than public schools. These increases are attributed to the general population increase within San Joaquin County, which grew at an annual average rate of 2.8% between 1980 and 1984.

An increase in school age children is expected to continue through the year 2010. Over the next five years, San Joaquin County is projected to see a 57% increase in enrollment, the third fastest growing student population in the State.³ Some school districts could accommodate a moderate increase in enrollment in their existing facilities while other districts will need new facilities to handle the projected growth.

The number of school sites required to accommodate the projected enrollment is based upon two factors: 1) an estimate of one student being generated from each new residence and 2) the various sizes of schools each school district desires. The standards for school enrollment are shown in Table II.E-13.

Development/School District Coordination. Land development and the subsequent population growth create increased demands for educational facilities. Coordination and consultation with the school districts should occur during the preparation of long-term growth plans and during the review of specific development projects. This will assure that the school districts have sufficient lead time to designate sites and plan for construction.

To assure that there is coordination with the school districts, all projects which could have an effect on a school district's enrollment should be referred to the district for review and comment. The school districts should help identify possible measures for reducing the impact of developments on their schools when possible.

Land Use Considerations.

School Facility Dedication. The state of California's Subdivision Map Act allows counties to adopt ordinances requiring subdividers to dedicate land which is needed for the purpose of constructing elementary schools necessitated by the subdivision. A section of the San Joaquin County Planning Title allows land reservation for schools which may be required.

TABLE II.E-12: SCHOOL ACTIVE ENROLLMENT DATA

	Graded Student Enrollment Figures					Annual Rate of Change		
	1967	1970	1975	1980	1984	1967-1970	1970-1980	1980-1984
Unified School Districts								
Escalon	1964	2037	1902	1764	1840	1.2%	-1.4%	1.1%
Lincoln	4512	4864	5529	6197	7182	2.5%	2.5%	3.8%
Linden	2098	2097	2002	1704	1719	.0%	-2.1%	0.2%
Lodi	11489	11714	11997	14432	17132	0.6%	2.1%	4.4%
Manteca	7397	8149	8261	8979	9911	3.3%	1.0%	2.5%
Ripon	1234	1281	1205	1169	1327	1.3%	-0.9%	3.2%
Stockton	31458	31130	26577	22144	25309	-0.3%	-3.3%	3.4%
Rural Elementary Districts ¹	1529	1583	1434	1435	1473	1.2%	-1.0%	0.7%
Tracy Elementary District	2988	2984	2952	2971	3380	.0%	.0%	3.3%
Tracy High School District ²	1694	1768	1776	1713	1902	1.4%	-0.3%	2.7%
Subtotal Public Schools (K-12)	66361	67607	63635	62508	71175	0.6%	-0.8%	3.3%
Private Schools (K-12)	NA	NA	5389	6754	7497	NA	3.6% ³	2.7%
Delta Community College (13-14)	7240	11591	13285	17744	15898	17.0%	4.4%	-2.7%
Total School Enrollment (K-14)	73601	89198	82309	87006	94570	2.5%	0.9%	2.1%

¹ Rural elementary districts are the following: Banta, Delta Island, Holt Union, Jefferson, Lammersville, New Hope, New Jerusalem, Oak View, and Rindge (from 1967-1980).

² Includes out of County students from Mountain House School District (Alameda County).

³ Includes only 1973-1980 figures.

NA Not Available

Source: San Joaquin County Superintendent of Schools. Statistical Bulletin No. 2 (1965-1984)
San Joaquin County Superintendent of Schools. Private Schools, Miscellaneous Information (1973-1984)

TABLE II.E-13: SCHOOL ENROLLMENT STANDARDS BY SCHOOL DISTRICT

<u>School District</u>	<u>K-6</u> <u>(# of Pupils)</u>		<u>7-8</u> <u>(# of Pupils)</u>		<u>9-12</u> <u>(# of Pupils)</u>
Escalon Unified ¹	600	(K-5)	600	(6-8)	600
Lincoln Unified ²	400-500		500		2,500
Linden Unified ³	100-200	(K-8)			700
Lodi Unified ⁴	500 ^a		780		1,460
	615 ^b		2,050		1,980
Manteca Unified ⁵	900	(K-8)			1,800
Ripon Unified ⁶	450	(K-8)			750-800
Stockton Unified ⁷	500-600		1,000-1,200		2,000-2,500
Tracy Joint ⁸	500	(K-5)	750	(6-8)	1,800-2,000

^a Average enrollment for a regular term.

^b Average enrollment for year-round school schedule.

Sources:

- ¹ Escalon Unified School District. Telephone conversation with Jacob Klessens, March 1986.
- ² Lincoln Unified School District. Telephone conversation with Beverly Holt, March 1986.
- ³ Linden Unified School District. Telephone conversation with Don Schwering, March 1986.
- ⁴ Lodi Unified School District. Telephone conversations with Mary Joan Starr, Facility Planner and Jack Dunn, Principal, Creekside School, March 1986.
- ⁵ Manteca Unified School District. Telephone conversation with Jim Thomas, March 1986.
- ⁶ Ripon Unified School District. Telephone conversation with Jim Thomas, March 1986.
- ⁷ Stockton Unified School District. Telephone conversation with Arthur Bachelor, March 1986.
- ⁸ Tracy Joint Union School District. Telephone conversation with Robin Blakely, Facilities Planner, March 1986.

AB 1929, passed by the State in early 1988, amends the Education Code and the Government Code as they relate to school facilities funding. Among other things, the governing board of any school district is authorized to levy a fee, charge, dedication, or other development requirement for the purpose of funding the construction or reconstruction of school facilities, subject to certain limitations. The requirements shall not exceed \$1.50 per square foot of habitable space for residential development, \$0.25 per square foot of covered or enclosed space for commercial or industrial development. However, residential development exclusively for senior citizens is subject to the rates for commercial or industrial development. The bill further makes school facilities constructed through the Mello-Roos Community Facilities Act eligible for funds from the State Allocation Board.

Locational Considerations. The effect educational facilities can have upon an area is significant; thus, a careful analysis of proposed sites is necessary. A number of factors are important to siting school facilities and are summarized below. Precise locations are established by the school districts and the State Department of Education, after it is determined whether a new facility is necessary.

Access. The site should be easily accessible by automobiles, buses, bicycles, and pedestrians. Public transportation should also be considered in areas where it is available.

Due to the amount of traffic generated by educational facilities they should be located on collectors or arterials depending on the size of the facility and the population to be served.

For safety, elementary schools should minimize the number of major street crossings required of students on their way to and from school.

High Schools should be located directly onto a Collector street as well as directly or indirectly to a secondary road.

Surrounding Land Uses. It is appropriate for elementary and middle schools to be located within the residential areas they serve. High schools, vocational and technical schools, large private schools, colleges and universities and other similar types of facilities which draw their students from a larger area should be located to serve their feeder elementary and middle school attendance areas. They may be located within or adjacent to high density residential or commercial areas, provided they are properly buffered.

Noise. Schools are noise generators and are also sensitive to noise. The traffic generated by educational facilities and the outdoor uses can generate significant amounts of noise. Therefore, they should not be located adjacent to noise sensitive uses such as hospitals or rest homes. Noise also affects schools, primarily in terms of speech and learning interference, and they should not be sited near noise generators such as certain industrial plants, highways, railroads, and airports.

Transmission Lines. Some studies indicate possible adverse health effects from the exposure to electromagnetic fields (EMF) from high voltage (500-750 kv) transmission lines. In addition, school playgrounds are commonly used by children and residents for recreation, kite flying, ball games, etc. which can be a potential conflict. Although rare, high voltage lines can also be downed in high winds and storms. Thus, for the protection of health and safety, schools should be located 400 feet or more from high voltage power transmission lines.⁴

Topography. A major portion of school sites are used for outdoor game fields and playgrounds; thus, sites with relatively level topography, less than 10% slope, and needing minimal grading are preferred.

Outside Floodplain. For obvious safety reasons, schools should be located outside the 100-year floodplain.

Airports.⁴ Schools should not be subject to existing or future aircraft noise levels of 65 db CNEL or Ldn, or greater. They should not be sited under any runway approach surface and at least one-half mile from any portion of a usable runway.

Endnotes

1. State of California, Department of Education. Enrollment and Staff in California's Private Elementary Schools and High Schools 1983-84, Superintendent of Public Instruction. Sacramento. 1984.
2. San Joaquin County Office of Education. Private Schools, Miscellaneous Information 1979 to 1985. January 1985.
3. Mary Joan Starr, Facility Planner, Lodi Unified School District. Personal communication. July 25, 1988.
4. State of California, Department of Education. School Site Selection and Approval Guide, Draft. September 10, 1987.

3. LIBRARIES

Public library services in Stockton began in 1880 and countywide in 1910. The Stockton-San Joaquin County public library system provides services throughout the County, except to Lodi, which has its own library. The Stockton-San Joaquin County Public Library presently has a collection of materials totalling over one million items with an annual circulation of nearly 1.9 million (1985-86). The library receives its financial support from the City of Stockton, San Joaquin County, and since 1984, the State of California through Public Library Foundation Program funding. Eight library service areas have been identified for metropolitan Stockton, and seven others for the balance of the County. The incorporated cities of Escalon, Manteca, Ripon, and Tracy are responsible for providing branch buildings and for furnishing, equipping, and maintaining those facilities.

Existing Services.

Central Library. The Central Library in Stockton is the heart of the Stockton-San Joaquin County Public Library system (see Figure II.E-13). In addition to having resources in greater depth and breadth than any other outlet, the Central Library provides support reference services for the branch libraries, support collections for the branches and a bookmobile, administrative coordination and support, technical and automation services, and storage space for the system. These functions are centrally located for efficiency and enables branch libraries to devote maximum square footage and effort to public services. Headquarters staff and offices for the seven county 49-99 Cooperative Library System are also housed at the Central Library.

Branch Libraries. Branch libraries extend library services to various communities in the County. In addition to the Central Library, the Stockton metropolitan area is served by three branch libraries. Manteca, Tracy, Escalon, Ripon, Linden and Thornton are the other branch libraries in the system. Each branch has its own collection of books and other materials and makes these available for loan to the public. The collections reflect the interests of the communities they serve. Each branch has a reference/information collection and staff trained to use it. The existing branch libraries of the Stockton-San Joaquin County systems are shown in Figure II.E-13.

Bookmobile. The bookmobile, or branch library on wheels, serves city and County neighborhoods which are distant from the Central Library or branches. Bookmobile schedules are flexible to enable the library to respond to changing population patterns caused by new housing developments, revitalized older neighborhoods, and seasonal influxes of agricultural workers. High usage at bookmobile stops in a particular neighborhood or area is often an indication that a permanent branch should be located there.

The bookmobile currently has 21 stops in Stockton and 17 (20 in summer) in San Joaquin County. All stops are situated in residential neighborhoods, shopping or business centers, or near parks, except for the County Women's Jail location.

**Figure II.E-13
LIBRARIES**

- EXISTING - EXISTING BUILDING ADEQUATE TO MEET DEMAND TO 2010
- ⊙ EXISTING - EXISTING BUILDING WILL NEED ADDITIONAL SPACE TO MEET DEMAND TO 2010
- PROPOSED

SOURCE: STOCKTON - SAN JOAQUIN COUNTY

- EXISTING -EXISTING BUILDING ADEQUATE TO MEET DEMAND TO 2010
- ⊙ EXISTING -EXISTING BUILDING WILL NEED ADDITIONAL SPACE TO MEET DEMAND TO 2010
- PROPOSED

SOURCE: STOCKTON - SAN JOAQUIN COUNTY
PUBLIC LIBRARY, AUGUST 1989
SAN JOAQUIN COUNTY DEPARTMENT OF
PLANNING AND BUILDING INSPECTION

Lodi Public Library. The Lodi Public Library is a municipal library owned and supported by the City of Lodi. In 1912 Lodi approved affiliation with the Stockton-San Joaquin County Public Library but withdrew in 1949 because it was the only city in the County paying a double library tax. Reciprocal services were maintained informally between the Lodi Public Library and the Stockton-San Joaquin County Public Library until 1967 when Lodi joined the 49-99 Cooperative Library System.

44-99 Cooperative Library System. Formed in 1967 and headquartered at the Central Library of the Stockton-San Joaquin County Public Library, the seven County public library system performs interlibrary loan and reference services and provides a daily delivery run, union lists, and specially funded programs and projects. In 1971 the Central Association of Libraries was formed to encourage participation of academic, special (business), and institution libraries in the area for a true multi-type system, the first of its kind in California.

Standards for Branch Library Buildings.¹ Criteria that indicate the need for the expansion of existing branches or establishment of new branches relate to population density, geographic environment, usage of present buildings or bookmobile stops, and expression of interest and need from local communities.

A full service library able to meet the varied needs of users could service approximately 20,000 people. Holding a collection of 30,000 volumes and space for special services, the library would require about 10,000 square feet of space. However, many areas of San Joaquin County have service area populations of less than 20,000. In these areas, a criterion of 0.5 square feet per capita can be used to determine space requirements; however, the minimum size library which is economically justified is 5,000 square feet. Where population (less than 5,000) and funding do not permit construction of this minimal size facility, alternatives include leased quarters and, in rural areas, bookmobile service.

It is preferable to keep branch libraries on a single level occupying no more than 35,000 square feet. Where the quantitative standards would result in a much larger facility, the service area should be divided or two service areas reapportioned. The number of branches in a metropolitan area is variable, so long as collectively, they and the central library provide adequate space for the total population needs. In urban communities, branch libraries should generally be no closer than 2.5-3 miles from each other.

Once it has been determined that a new branch library is warranted, the specific site is determined by many factors, including the following:

- o Its location should consider the community's sociological, geographical, and environmental aspects.
- o The site should have sufficient frontage to be visible to people passing by.
- o It should be on or near an important traffic intersection and on a well-travelled thoroughfare.

TABLE II.E-14: LIBRARY SYSTEM IMPROVEMENTS

<u>Community</u>	<u>Facility</u>	<u>Need</u>
Stockton	Central Library	Size will be adequate.
	Fair Oaks Branch	Size will be adequate.
	Southeast Branch	New building is being planned.
	Margaret K. Troke Branch	Expansion is needed even with portion of present service area served by new branch libraries.
	Northwest Branch	Proposed new branch.
	Northeast Branch	Proposed new branch.
	Southwest Branch	Proposed new branch, allowing Southeast Branch to be closed.
Escalon	Escalon Branch	Building should be replaced; in planning stages.
Linden	Linden Branch	Building should be replaced.
Lathrop	Lathrop Branch	Proposed new branch to be built when population reaches 10,000.
Manteca	Manteca Branch	Existing building should be replaced.
Ripon	Ripon Branch	Building should be replaced.
Thornton	Thornton Branch	Existing building is adequate; can be expanded if necessary.
Tracy	Tracy Branch	Second branch should be planned.
Lockeford	Lockeford Branch	Proposed new branch. Lockeford is now served by a bookmobile.
Lodi	Lodi City Library	Size is adequate for the planning period (to 2010), but joint planning should consider a new branch.

- o It should be where people congregate, not necessarily where they live.
- o It should be accessible by car, bicycle, foot, and public transportation.
- o It should be easily reached by children coming alone.
- o It should be located where sufficient off-street parking is available.
- o It should contain sufficient area to allow for future growth.

Future Demand for Public Library Facilities.^{1,2} To serve the population projected by several new branch libraries will be needed and some of the existing libraries will need to be expanded. Table II.E-14 shows library facility needs during the planning period.

Endnotes

1. Stockton-San Joaquin County Public Library. Branch Library Study. Prepared by David Sabsay. September 1987.
2. Donna Brown, Assistant Director of Library Services. Personal communication. May 23, 1988.

4. SOCIAL CARE FACILITIES

Social care facilities are defined as facilities which provide direct services to dependent County residents (i.e., persons who are children, elderly, ill or indigent). Some of these facilities are operated directly by the County, while others are run by local governments, federal and state agencies, and non-profit organizations.

Social care facilities can be grouped into three major types: 1) family services, 2) indigent care, and 3) health care facilities. The role of the County with respect to each of these service categories will be discussed briefly below.

Family Services. In addition to managing the Mary Graham Children's Shelter, the County provides substantial assistance to private organizations which operate family service facilities. The Stockton Family Shelter and the Women's Center of San Joaquin County are examples of programs which have benefited from County support.

Services for elderly residents are provided through the County Department of Human Services, local governments, and numerous private organizations. Programs include adult protective services, in-home support services which enable the elderly to remain in their homes, counseling, meals and recreation.

In addition to the above activities, the County has primary responsibility for the implementation of federal and state mandated human service programs. A new human services facility is now open which will provide room for the expansion of such programs into the next century.

Indigent Care. Although the County is not directly involved in the operation of social care facilities for the indigent, assistance is provided to private organizations for this purpose. For example, beginning in 1988, the County made provisions for the use of a farm labor camp south of Stockton as temporary shelter for the homeless. This facility is administered by the Stockton Shelter for the Homeless. Other services for indigent residents are provided by the Emergency Food Bank, St. Mary's Dining Hall, Salvation Army, United Way of San Joaquin County and a variety of other private, non-profit organizations.

Health Care Facilities. Health care services are provided directly by the County through the San Joaquin General Hospital and the County Public Health Services. These services include general medical care, mental health services and drug dependency programs. In addition to health care facilities managed by the county, there are six private general care facilities (see Table II.E-15). A number of smaller clinics, home health agencies and intermediate care facilities are located throughout the County, providing outpatient services and emergency care. There are many convalescent facilities, skilled nursing facilities, and adult day care services for elderly residents. Finally, there are numerous specialized hospitals, rehabilitation clinics and treatment centers which provide psychiatric, alcoholism and drug dependency services.

Many of the above mentioned facilities are in various stages of planned expansion. Thus, it appears as though the future health care needs of County residents are being anticipated and addressed.

Issues. A variety of changing social conditions can be expected to occur within the County during the planning period. Foremost among these expected changes are the growing proportion of elderly residents, the increased number of dependent children, and the growing incidence of homelessness and mental illness. From a policy perspective, the location, capacity and accessibility of new facilities to serve these target populations becomes a central issue.

In addition to the growing number of dependent residents, the problem of access to social care facilities for residents of rural and outlying areas will continue to present a challenge through the duration of the planning period. This may be particularly true with respect to programs for the elderly, given their generally limited mobility. Therefore, continuing steps must be taken to promote access to social care facilities for those residing outside of the County's major urban centers.

TABLE II.E-15: SAN JOAQUIN COUNTY HOSPITAL FACILITIES ¹

<u>Hospital</u>	<u>Number of Beds</u>	<u>Future Growth</u>	<u>Comments</u>
STOCKTON:			
San Joaquin County General Hospital	233	Replacement hospital	Existing facility completion 1995 converted to out patient use
St. Joseph's Hospital	321	58,500 sq. ft.	New 450 space out patient clinic parking garage completed 1988
Dameron Hospital	167	52 bed addition	Completed 1988
Kaiser Hospital		200 bed ultimate, offices, and parking	Four phases, completion 2000
LODI:			
Doctor's Hospital of Lodi	93		
Lodi Memorial Hospital	101		
MANTECA:			
Doctor's Hospital of Manteca	49	27 bed expansion	Planned 1988
TRACY:			
Tracy Community Memorial Hospital	59	18 bed expansion	Planned 1990
TOTAL	1023 beds + 297 new beds + 1320 beds total		

Source: Sedway Cooke Associates, Hospital Facility Survey, April 1988.

There is a great deal of interest in the study of the human mind, and it is one of the most important branches of knowledge. The study of the mind is a very old one, and it has been the subject of many different theories and hypotheses. The study of the mind is a very important one, and it is one of the most important branches of knowledge.

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A. SEISMIC AND GEOLOGIC HAZARDS

1. SEISMIC HAZARDS

Introduction. Seismic hazards are those effects associated with earthquakes. Earthquakes occur along faults, earth fractures or zones of fracture along which the rocks on one side have been displaced in relation to those of the other side. Three basic types of fault exist: active, potentially active, and inactive.

- active fault - a fault along which historic movement (within the past 11,000 years) has taken place and can be expected to move within the next 100 years, or one that a competent geologist considers active.
- potentially active fault - a fault that last moved within the Quaternary Period before the Holocene Epoch (11,000 - 2,000,000 years ago), or one which because it is judged to be capable of ground rupture or shaking, poses an unacceptable risk for a proposed structure.
- inactive fault - an identifiable fault which shows no evidence of movement in recent geologic time and no potential for movement in the relatively near future.

Earthquakes are commonly described by the amount of energy they release. The scale used to indicate energy release is the Richter Scale. As the scale is logarithmic, an increase of one number in magnitude is the same as a 32 times increase in energy. A magnitude 7 earthquake releases 32 times more energy than a magnitude 6 earthquake.

A second common measure of seismic activity is the Modified Mercalli scale which describes the intensity of an earthquake in terms of its physical effects. The scale ranges from I (shaking not felt but objects observed swaying) to XII (general panic with nearly total structural damage). Table III.A-1 shows the physical effects associated with each intensity scale.

Fault Systems In and Near the County.¹ San Joaquin County, like all of California, is a seismically active region. The seismicity of a region is described by the distribution, recurrence, and intensity of earthquakes over a period of time. The County is located in Seismic Zone 3, as defined by the Uniform Building Code. Building standards and regulations in this zone assume earthquakes with the potential to make standing difficult and to cause stucco and some masonry walls to fall. In 1972 the California Legislature enacted the Alquist-Priolo Special Studies Zones Act, which requires the State Geologist to delineate Special Studies Zones around all known traces of potentially and recently active faults in California. The California Division of Mines and Geology (CDMG) has not yet surveyed San Joaquin County, although there are a number of known faults within the County (see Figure III.A-1).

San Andreas Fault. The San Andreas Fault is one of the longest and most active faults in the world. The surface trace of this fault extends from the Northern California coast line to the Gulf of California, a

distance of over 600 miles. The last major ground rupture of this fault in the Bay Area occurred in 1906 and induced strong seismic shaking in San Joaquin County. The probability of a large earthquake (magnitude 7) within the next 30 years along the San Francisco Bay segment is 0.5.¹

Hayward Fault.² The Hayward Fault is located east of San Francisco Bay and extends southeast to where it probably merges with the Calaveras Fault north of the City of Hollister. The recent history of this fault shows two major earthquakes (1836 and 1868), each with an estimated Richter Scale magnitude of 6.5-7.5). In addition, between January 1969 and September 1973 approximately 70 small earthquakes were recorded along the fault. Tectonic creep continues to damage structures that cross the fault zone.

Calaveras Fault.² The Calaveras Fault, approximately 100 miles long, borders the eastern flank of the Berkeley-Hayward Hills and extends southeast where it joins the San Andreas Fault south of the City of Hollister. Due to the physiographic and geologic evidence and earthquake epicenters located along the trace of the fault, the Calaveras Fault Zone is considered active.

Green Valley-Concord Faults.² This fault zone, extending from Walnut Creek to west of Fairfield, has experienced displacement throughout most of its length within recent geologic time. An earthquake of 5.4 magnitude occurred in 1955 along part of the fault near Concord. There is currently evidence of some movement along the fault in the City of Concord. The greatest probable earthquake generated by this fault is not expected to exceed a magnitude of 7.0 on the Richter Scale.

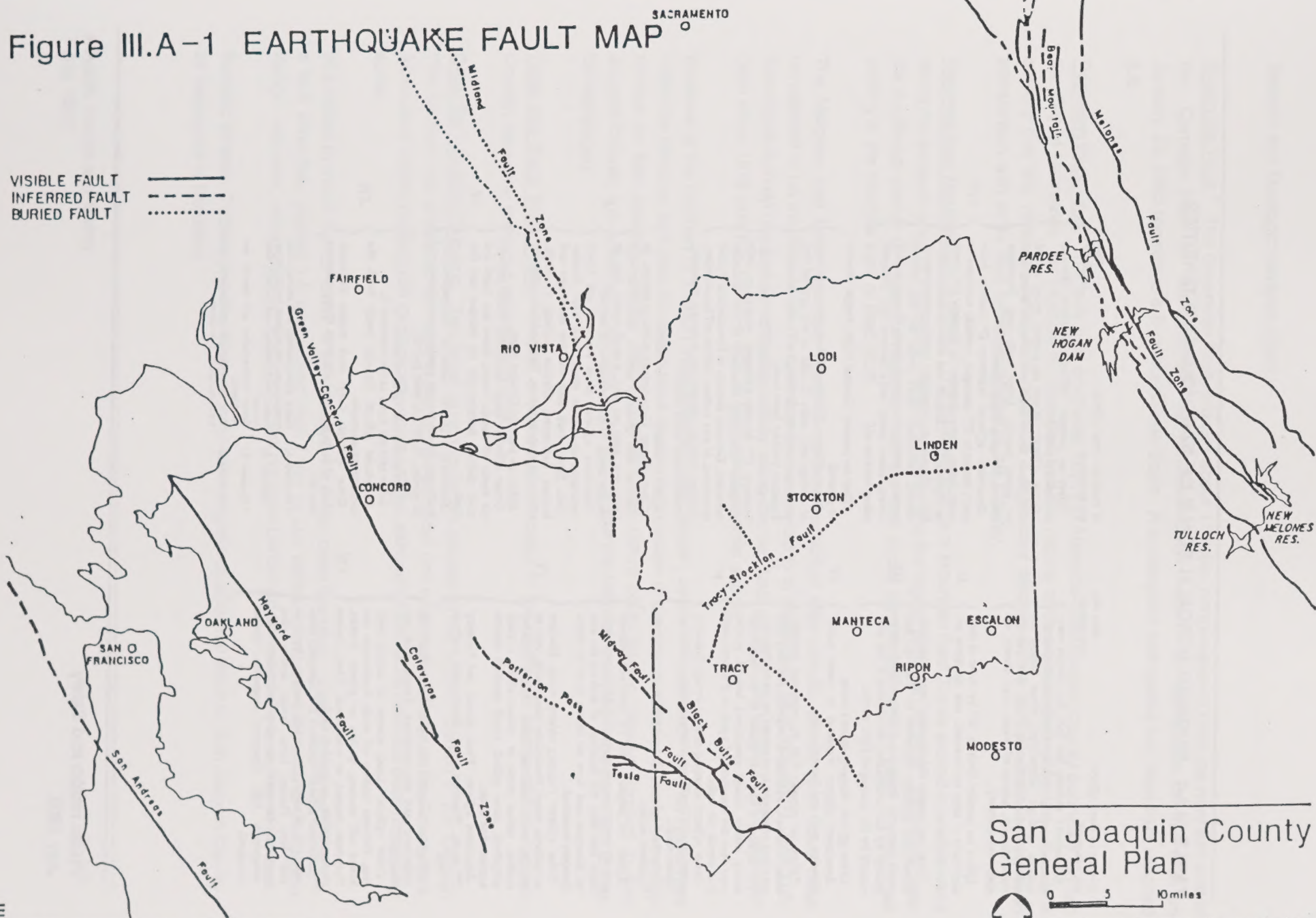
Tracy-Stockton Fault.² This fault crosses the County from the southwest near Tracy to the northeast near Linden. Passing beneath the City of Stockton, the fault has no surface trace, and its position has been determined only from oil well log data. Subsurface data indicate that no appreciable movement has occurred on this fault for three million years or more. Normally, this evidence would suggest that the fault is inactive. On April 10, 1881 an earthquake occurred near Linden having an estimated Modified Mercalli intensity of VII.³ In addition, two other smaller earthquakes (Richter Magnitude 4) occurred on September 19 and 20, 1940 approximately five miles south of Linden. It is not certain whether these earthquakes were part of a northeast extension of the Stockton-Tracy Fault. This seismic activity raises the possibility of an active fault capable of at least a 5.0 magnitude earthquake located in or near the central part of San Joaquin County.

Midland Fault. Buried under the San Joaquin Delta, the Midland Fault is not well documented. The fault extends north from Bethel Island in the Delta to east of Lake Berryessa. However, there is evidence that fault displacement has occurred during the Quaternary period. The maximum probable earthquake which could be generated by this fault is a magnitude of 7.0 on the Richter Scale.

Antioch Fault. The Antioch Fault area is subject to relatively frequent earthquakes. During the ten-year period 1962-1971, general purpose seismographs recorded nine earthquakes having a Richter magnitude in the range of 2.5 to 5.0, and more than twenty smaller earthquakes were centered in the vicinity of Antioch.

Figure III.A-1 EARTHQUAKE FAULT MAP

VISIBLE FAULT ———
 INFERRED FAULT - - - - -
 BURIED FAULT



San Joaquin County
 General Plan



0 5 10 miles

Sedway Cooke Associates

SOURCE: California Division of Mines & Geology;
 Fault Map of California, 1975

TABLE III.A-1 MODIFIED MERCALLI SCALE OF EARTHQUAKE INTENSITIES

<i>If most of these effects are observed</i>	<i>then the intensity is:</i>	<i>If most of these effects are observed</i>	<i>then the intensity is:</i>
Earthquake shaking not felt. But people may observe marginal effects of large distance earthquakes without identifying these effects as earthquake-caused. Among them: trees, structures, liquids, bodies of water sway slowly, or doors swing slowly.	I	<i>Effect on people:</i> Difficult to stand. Shaking noticed by auto drivers.	VIII
<i>Effect on people:</i> Shaking felt by those at rest, especially if they are indoors, and by those on upper floors.	II	<i>Other effects:</i> Waves on ponds; water turbid with mud. Small slides and caving in along sand or gravel banks. Large bells ring. Furniture broken. Hanging objects quiver.	
<i>Effect on people:</i> Felt by most people indoors. Some can estimate duration of shaking. But many may not recognize shaking of building as caused by an earthquake; the shaking is like that caused by the passing of light trucks.	III	<i>Structural effects:</i> Masonry D° heavily damaged; Masonry C° damaged, partially collapses in some cases; some damage to Masonry B°; none to Masonry A°. Stucco and some masonry walls fall. Chimneys, factory stacks, monuments, towers, elevated tanks twist or fall. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Decayed piling broken off.	
<i>Other effects:</i> Hanging objects swing. <i>Structural effects:</i> Windows or doors rattle. Wooden walls and frames creak.	IV	<i>Effect on people:</i> General fright. People thrown to ground.	
<i>Effect on people:</i> Felt by everyone indoors. Many estimate duration of shaking. But they still may not recognize it as caused by an earthquake. The shaking is like that caused by the passing of heavy trucks, though sometimes, instead, people may feel the sensation of a jolt, as if a heavy ball had struck the walls.	V	<i>Other effects:</i> Changes in flow or temperature of springs and wells. Cracks in wet ground and, on steep slopes, steering of autos affected. Branches broken from trees.	IX
<i>Other effects:</i> Hanging objects swing. Standing autos rock. Crockery clashes, dishes rattle or glasses clink. <i>Structural effects:</i> Doors close, open or swing. Windows rattle.		<i>Structural effects:</i> Masonry D° destroyed; Masonry C° heavily damaged, sometimes with complete collapse; Masonry B° is seriously damaged. General damage to foundations. Frame structures, if not bolted, shifted off foundations. Frames racked. Reservoirs seriously damaged. Underground pipes broken.	
<i>Effect on people:</i> Felt by everyone indoors and by most people outdoors. Many now estimate not only the duration of shaking but also its direction and have no doubt as to its cause. Sleepers awakened.	VI	<i>Effect on people:</i> General Panic.	X
<i>Other effects:</i> Hanging objects swing. Shutters or pictures move. Pendulum clocks stop, start or change rate. Standing autos rock. Crockery clashes, dishes rattle or glasses clink. Liquids disturbed, some spilled. Small unstable objects displaced or upset.		<i>Other effects:</i> Conspicuous cracks in ground. In areas of soft ground, sand is ejected through holes and piles up into a small crater, and, in muddy areas, water fountains are formed.	
<i>Structural effects:</i> Weak plaster and Masonry D° crack. Windows break. Doors close, open or swing.	VII	<i>Structural effects:</i> Most masonry and frame structures destroyed along with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes and embankments. Railroads bent slightly.	XI
<i>Effect on people:</i> Felt by everyone. Many are frightened and run outdoors. People walk unsteadily.		<i>Effect on people:</i> General panic.	
<i>Other effects:</i> Small church or school bells ring. Pictures thrown off walls, knickknacks and books off shelves. Dishes or glasses broken. Furniture moved or overturned. Trees, bushes shaken visibly, or heard to rustle.		<i>Other effects:</i> Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land.	XII
<i>Structural effects:</i> Masonry D° damaged; some cracks in Masonry C°. Weak chimneys break at roof line. Plaster, loose bricks, stones, tiles, cornices, unbraced parapets and architectural ornaments fall. Concrete irrigation ditches damaged.		<i>Structural effects:</i> General destruction of buildings. Underground pipelines completely out of service. Railroads bent greatly.	
		<i>Effect on people:</i> General panic. <i>Other effects:</i> Same as for Intensity X. <i>Structural effects:</i> Damage nearly total, the ultimate catastrophe. <i>Other effects:</i> Large rock masses displaced. Lines of sight and level distorted. Objects thrown into air.	
		• Masonry A: Good workmanship and mortar, reinforced, designed to resist lateral forces. • Masonry B: Good workmanship and mortar, reinforced. • Masonry C: Good workmanship and mortar, unreinforced. • Masonry D: Poor workmanship and mortar and weak materials, like adobe.	

Greenville Fault.² The Greenville Fault extends about 11 miles northwestward from the northern end of the Carnegie Fault to the southern tip of Marsh Creek Fault. An earthquake on this fault on January 24, 1980 registered 5.5 on the Richter Scale. A subsequent earthquake two days later reached 5.8.

Patterson Pass Fault. This fault runs northwest from the Alameda-San Joaquin County boundary toward the City of Livermore. Its location is imprecise and the nature of its movement is uncertain. It seems unlikely that this relatively small fault presents a significant seismic threat to San Joaquin County in comparison with other fault systems located in the County.

Melones-Bear Mountain Fault Zones. The Melones and Bear Mountain Fault Zones extend in a wide band along the western edge of the Sierra Nevada Mountains in the higher elevation foothills. Beginning near the southeast corner of Yosemite National Park, the fault zones run through Mother Lode communities ending in the foothills east of Red Bluff.

The Melones and Bear Mountain Fault Zones have exhibited little seismic activity and have been considered to be inactive, since no evidence have been found of Quaternary fault movement. The U.S. Geological Survey has been monitoring activity along the two fault zones in the vicinity of New Melones Dam since 1972 and has found a lack of even micro-seismic activity.

Because of the location of Tulloch, New Melones, New Hogan, Jackson Creek and Pine Flat Reservoirs within the Melones and Bear Mountain Fault Zones, the question of the activity of these faults is extremely serious for San Joaquin County. Since upstream dam failure could lead to massive flooding in San Joaquin County, it is extremely important to the County that the Melones and Bear Mountain Fault Zones be reanalyzed.

Tesla and Black Butte Faults. Neither of these faults, located in the southwest corner of San Joaquin County, have any recorded evidence of activity.

Other San Joaquin Systems. Two small buried faults are located in the western portion of the County. The northern one is located on Roberts Island, and the other one extends from Banta to the County line. Associated landforms suggest geologically recent activity, although these faults have not been historically active.

In addition to these buried faults, a San Joaquin Fault has been identified. Based on partial evidence, a fault zone may parallel 1-5 and extend from Tracy to Los Banos, along the east flank of the Diablo Range. However, more detailed investigation has not been performed to confirm the existence of the fault.

Seismic Effects. Table III.A-2 identifies the faults with the greatest potential effect on San Joaquin County as measured at Stockton.

The effects of an earthquake are described below. They include direct effects such as ground rupture and ground shaking, as well as indirect effects such as liquefaction, subsidence, dam failures, etc.

Ground Rupture. During an earthquake, the ground can rupture horizontally and/or vertically, which can cause significant damage. For example, this type of hazard can crack building foundations, destroy roads and bridges, and break utility lines. Ground rupture is most likely to occur along lines of previous fault systems, meaning that the southern portion of the County is more vulnerable to this hazard than other parts of the County. However, ground rupture usually is restricted to earthquakes of more than 5.5 magnitude on the Richter Scale. Although the County has experienced earthquakes of this magnitude in the past, there is no known occurrence of local ground rupture.

Ground Shaking. Ground shaking is the most widespread effect of earthquakes, and poses a greater seismic threat than local ground rupture. The most likely sources of strong ground shaking are from the San Andreas, Hayward, Calaveras, Midland, Green Valley-Concord, and Tracy-Stockton Faults.

The probability of occurrence of major earthquakes on one of these faults is relatively high. A major earthquake could result in maximum ground shaking of intensity VII+ on the Modified Mercalli Scale in San Joaquin County. Strong ground shaking of this magnitude could result in significant damage to unreinforced masonry buildings built before 1933. Mobilehomes and structures not properly secured to foundations can be dislodged. In addition, ground shaking can cause nonstructural hazards to occur, such as falling ceilings and light fixtures, toppling of exterior parapets, shattered glass, and movement of furniture and heavy equipment.

Damage is generally greatest in areas where soils and surficial units are fine-grained, compressible, and saturated with water. Conversely, damage seems to be least in areas of little or no surficial material or where bedrock is massive, hard, dry, and relatively unfractured or unweathered.

Because soil depths are greatest in Stockton, Tracy, and much of the unincorporated areas of San Joaquin County, ground shaking would most effect taller structures (3-4 stories high) in these areas.

The shallower deposits and stiffer soils in the foothills of the southwest and eastern areas of the County tend to produce ground shaking having maximum effect on low rigid structures and lesser effect on tall structures.¹

Liquefaction. Liquefaction is a hazardous situation that occurs when a water-saturated, cohesionless soil loses its strength and liquefies, typically because of intense and prolonged ground shaking. Whether soils actually liquefy depends on the intensity of the ground shaking and its duration. With loose soils, liquefaction can occur with shorter durations and lesser intensity shaking. Denser soils will withstand longer durations of shaking and more intense shaking before liquefaction takes place. The type of ground motion expected from large earthquakes felt in San Joaquin County is expected to be a rolling type motion, which would be less likely to cause liquefaction.

TABLE III.A-2:
MAJOR FAULTS POTENTIALLY AFFECTING SAN JOAQUIN COUNTY

Fault	Distance From Stockton (miles)	Maximum Probable Earthquake ¹	Maximum Credible Earthquake ²	Recurrence Interval (years)	Maximum Intensity of Maximum Credible Earthquake (San Joaquin County)	Years of Historic Damaging Earthquakes
San Andreas Fault Zone	66	7.8-8.25	8.25-8.5	300 140	VIII-IX	1838, 1906
Calaveras	42	6.75	6.75-7.3	150	VIII-IX	1861
Hayward	48	7.25	7.0-7.5	264	VIII-IX	1836, 1868
Green Valley- Concord	44	6.7	6.5-7.25	319	VII-VIII	1955
Antioch	30	6.6	5.75-6.6		VII-VIII	1889?, 1965
Greenville	30	6.8	6.9	> 10,000	VII-VIII	1980
Midway	24	6.3	6.3	2,651	VII-VIII	None known
Ortogonalita	32	6.7	6.7	10,000	VII-VIII	None known
San Joaquin	32	6.6	Unknown	1,083	Unknown	None known
Foothills Fault Zone	13	6.8	6.0	> 10,000	VIII-IX	1975
Midland	19	-	7.0	Unknown	VIII-IX	1889?

Note: Those years which are followed by a question mark (?) are estimated.

¹ Maximum probable earthquake is the maximum earthquake that appears to be reasonably expected within the next 100-year period.

² The maximum credible earthquake is the maximum earthquake that might reasonably occur under the conditions presently known.

Source: BASELINE Environmental Consulting, April 1986

Areas which have the greatest potential for liquefaction are those areas in which the water table is less than 50 feet below ground and soils are predominantly clean, comprised of relatively uniform sands, and are of loose to medium density. Clay-type soils are generally not subject to liquefaction. The closer the ground water is to the surface, the greater is the potential for liquefaction.

Soil types considered most susceptible to liquefaction are found in the Manteca-Lathrop area, the area just west of Woodbridge (including a small portion of the townsite), and the Delta. The soils in the Tracy area are not considered to be as susceptible to liquefaction, even though the groundwater is high, because the near-surface soils are predominantly clays or sands with high silt and clay content. The east and northeast portions of the County are less susceptible because groundwater is deep. The most serious threat to public health and safety from liquefaction lies in the Delta. Many of the Delta levees are directly underlain by relatively clean, water-saturated sands and peats. Strong ground shaking could cause liquefaction under these levees and lead to levee failure and localized flooding. Figure III.A-2 shows the depth of the groundwater table based on lines of equal depth to water in wells in the Fall of 1987. Combined with a map showing unconsolidated and water saturated sediments (usually sands and silts), the areas of shallow groundwater (less than 50 feet) provide an indicator of high liquefaction potential.

Subsidence. Earthquake motion can cause a settlement or shakedown of soils which can result in localized subsidence. This settlement is most likely to occur in areas where water tables are deep (otherwise liquefaction could occur), the soils are of loose to medium density, and the soil profile includes a strata of loose, clean, uniformly graded sand. In general, the Lodi-Thornton areas and areas southwest of Tracy are potential sites for subsidence due to their soil conditions. The Manteca-Lathrop-French Camp area could be subject to shakedown during periods of low groundwater levels. However, given the expected types of ground motion in the County from an earthquake, the potential for seismically induced subsidence is considered relatively low.

Water Movement. Water movement resulting from seismic activity includes landslide splashes and seismic seiches. An added hazard is flooding due to dam or levee failures, and is discussed separately in the Flood Hazard Technical Appendix. There are no historical records of seismic-generated water movement occurring in or adjacent to San Joaquin County. This should not, however, rule out the possibility of one occurring in the future. A seismically-induced wave in the Delta channels could damage levees causing localized flooding. The occurrence of a seismic-generated landslide splash in one of the reservoirs located in the County could result in dam failure and flooding.

Figure III.A-2 LINES OF
EQUAL DEPTH TO WATER IN WELLS, SPRING 1988



2. OTHER GEOLOGIC HAZARDS

Subsidence. Subsidence is the gradual, local settling or sinking of the earth's surface with little or no horizontal motion. It is usually the result of gas, oil or water extraction, hydrocompaction, or peat oxidation. In San Joaquin County, subsidence is generally attributed to the overdrafting of groundwater basins and from peat oxidation of the Delta islands. Effects of subsidence include lower levees, lower islands, flooding, infrastructure failure, crop losses, disruption to recreation, and increased maintenance costs. Overdrafting occurs when the groundwater is pumped out faster than it can be replenished. As a result, the overlying ground sinks. Overdrafting in recent years has decreased because more surface water has been imported to meet the County's needs.

Subsidence in the Delta is more complex and poses more serious problems for the County. Deep subsidence is thought to be caused by tectonic movement, natural consolidation, groundwater withdrawal, and gas and oil withdrawal. The primary causes of shallow subsidence are oxidation, anaerobic decomposition, shrinkage, wind erosion, compaction by farm equipment, burning, and export by people. Present data indicate that rates of subsidence in the Delta are site specific. No single rate (such as the commonly used 3 inches per year) is valid throughout the Delta or for all locations on individual islands.

Island subsidence was analyzed by review of the Walter W. Wier Transect, the Mokelumne Aqueduct, and quadrangle maps. The Walter Weir study measured elevations along a transect established in 1922. Trend data indicate that the rate of subsidence may be decreasing with time. A possible additional settlement of 17 inches has been projected for a subsidence rate of less than 2 inches per year between now and the year 2000. Calculations of subsidence along the East Bay Municipal Utility District's Mokelumne Aqueduct between 1961 and 1986 show an average settlement of 0.8 inches per year on Upper Jones Tract, 1.2 inches per year on Woodward Island, and 0.7 inches per year on Orwood Tract. Finally, U.S.G.S topographic quadrangle maps have been used in the past to estimate island subsidence rates. A comparison of the contours are made at different points in time. This technique yields rates of subsidence that agree closely with a number of other studies, 2.8-3.3 inches per year.⁴

An estimated 200,000 acres of the Delta including a majority of the islands are below sea level at elevations as low as minus 25 feet. These conditions increase the hydrostatic pressure on the levees and make them more susceptible to breaches. If subsidence is not stabilized, it could ultimately lead to the loss of the entire Delta area for agricultural operations, the flooding of the islands, and the formation of a large inland sea.

Subsidence cannot be completely abated; the process can only be slowed. Methods for long-term abatement could mean major changes in Delta farming and a reduction in agricultural production. Increasing the groundwater levels to reduce subsidence will limit agricultural crops to shallow root crops, such as grasses, grains and clover. In addition, high groundwater levels could cause tillage problems and result in higher salt levels in the soil. Methods to reduce wind erosion will also reduce the amount of land available for agricultural production.

Slope Instability. The downslope movement of earth materials, often referred to as mass movements (creep, mudflows, landslides, rockfalls, etc.), is a normal geologic process by which slopes are flattened

and valleys are widened. Although most of these movements are considered to be minor or insignificant, there are areas where slope failures pose a major geologic hazard.

Slope stability hazards within San Joaquin County are mostly confined to three areas: 1) the foothills and mountain terrain which border the San Joaquin Valley (see Figure III.A-3), 2) the steep banks of the major rivers which pass through the Valley floor, and 3) the levees of the Delta. The first area is most susceptible to unstable slope conditions and specifically includes the steep hills of the Diablo Range in the southwest section of the County and the Sierra Nevada Foothills along the County's eastern edge. Combined, they equal about 20% of the total area of the County. Slope failures along steep river embankments although not of great countywide significance could be a major local hazard. This type of instability occurs when major streams have cut sharp banks into the Valley floor, undercutting or oversteepening their banks. A significant number of Delta levees are susceptible to failure because of slope movement. The use of unconsolidated materials for levee construction increases the risk of slope failure and flooding. Levee failure is discussed further in the Flood Hazard Chapter.

Expansive Soils. Expansive soils, such as clay, swell when they absorb water and shrink as they dry. The basic cause of expansion is the attraction and absorption of water in the expandable crystal structures of clays. The areas of San Joaquin County with the greatest shrink-swell soil problems are the Delta, the areas north and west of Tracy, and the Stockton-French Camp area as far east as Farmington (see Figure III.A-4).

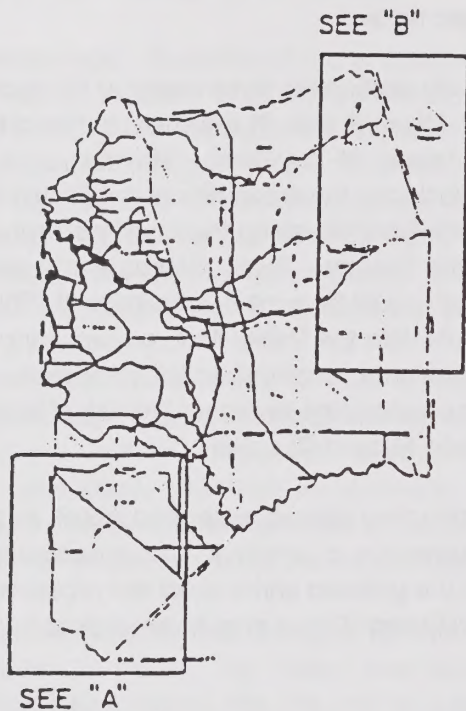
Expansive soils must be recognized because they can cause building foundation cracking during wet or dry periods. Moreover, various structural portions of a building may become distorted, such that doors and windows do not function properly. These hazards can be avoided through proper drainage and foundation design. The State Subdivision Map Act requires soil reports for all major subdivisions. If expansive soils are recognized through appropriate soils testing, corrective measures can be designed into the foundations.

Erosion. Erosion is the process of detachment and movement of soil particles by wind and water. Erosion can result in the loss of topsoil, diminishing agricultural production in certain areas of the County, and sedimentation of the loosened soil particles can harm water quality and pose health hazards.

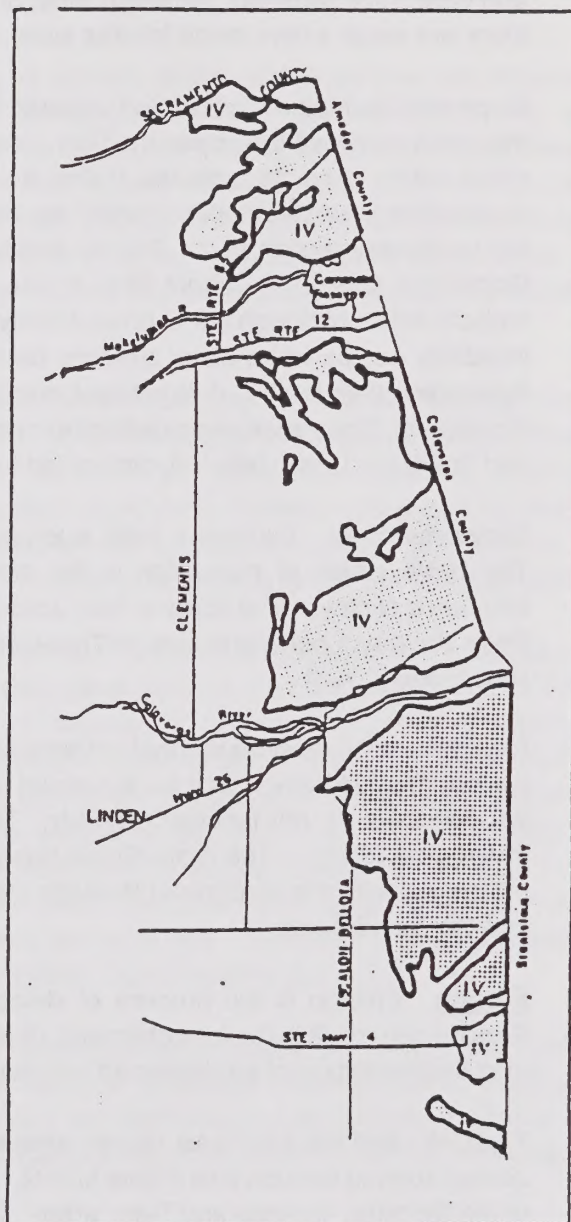
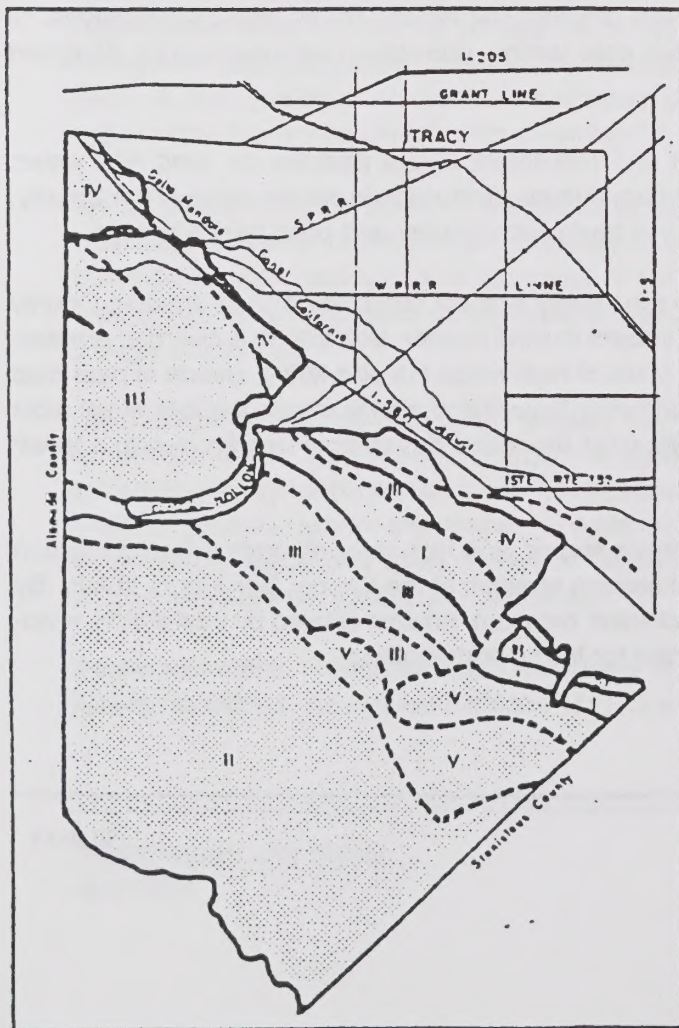
The Delta and the southeast county area east to the county line are two areas of San Joaquin County subject to wind erosion (see Figure III.A-5). Areas subject to wind erosion also extend outward to portions of the Stockton, Lathrop and Tracy areas. During times of high winds (15 plus MPH), clouds of peat dust can be seen in the Delta. This dust is a health and safety hazard and contributes to the loss of valuable agricultural soils. At times, roads through the Delta must be closed due to poor visibility during a "peat" storm.

Water erosion from a combination of loose soils, steep slopes, and high rates of runoff is taking place in the Delta and in the foothills in the southwest and eastern sections of the County (see Figure III.A-6). By reducing the ability of the Delta levees to withstand water pressure, erosion caused by tidal action, wind-induced waves, and boating, increases the potential for failure and flooding.

Figure III.A-3 AREAS SUBJECT TO LANDSLIDES



"A"



San Joaquin County General Plan



0 1 2 5 10 miles

Sedway Cooke Associates

landslide susceptibility rating	% of the area in which landslides have been identified
I	20%
II	12 %
III	8 %
IV	4 %
V	1 %

Figure III.A-4
SOIL LIMITATION RATING FOR SHRINK SWELL BEHAVIOR

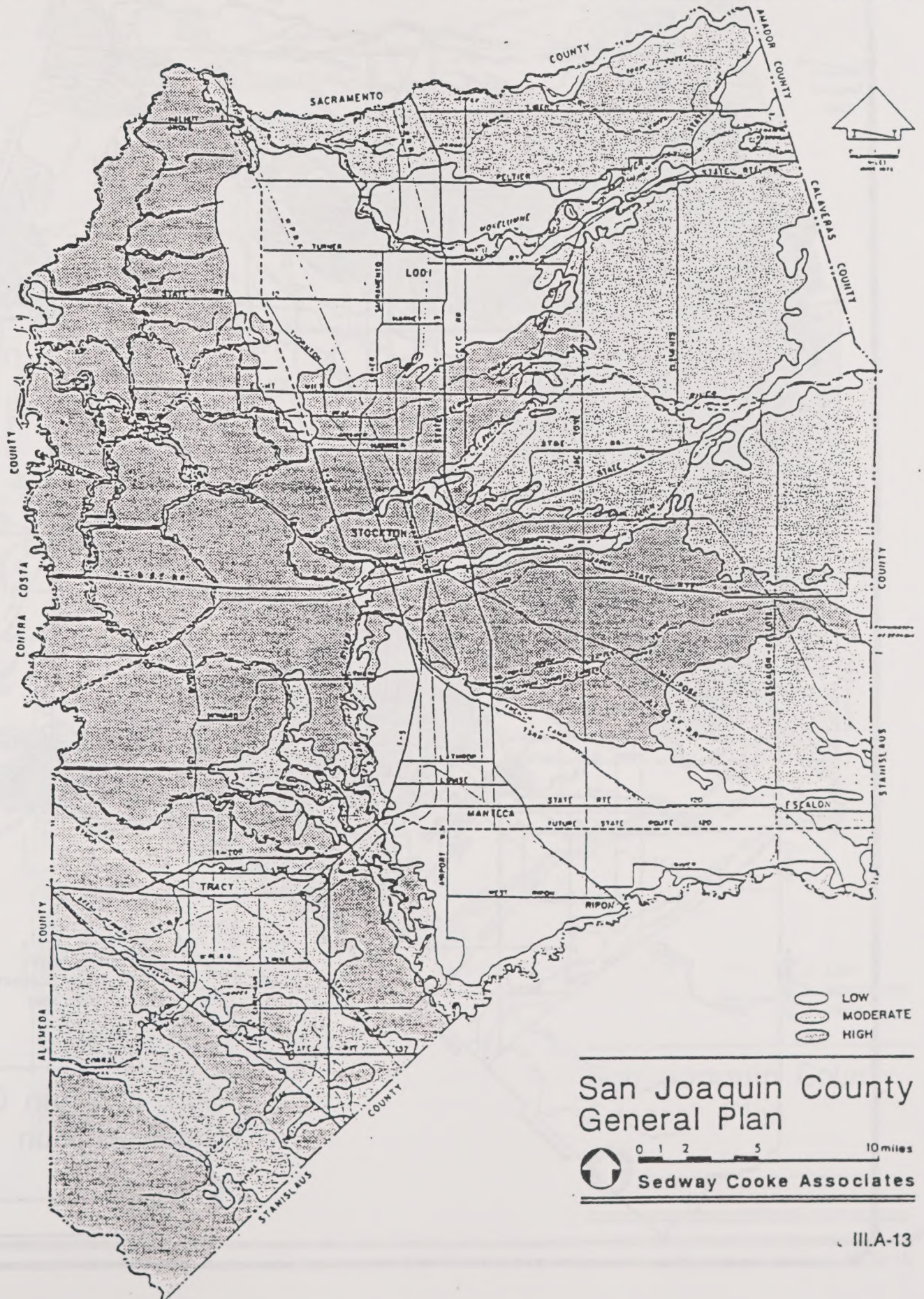
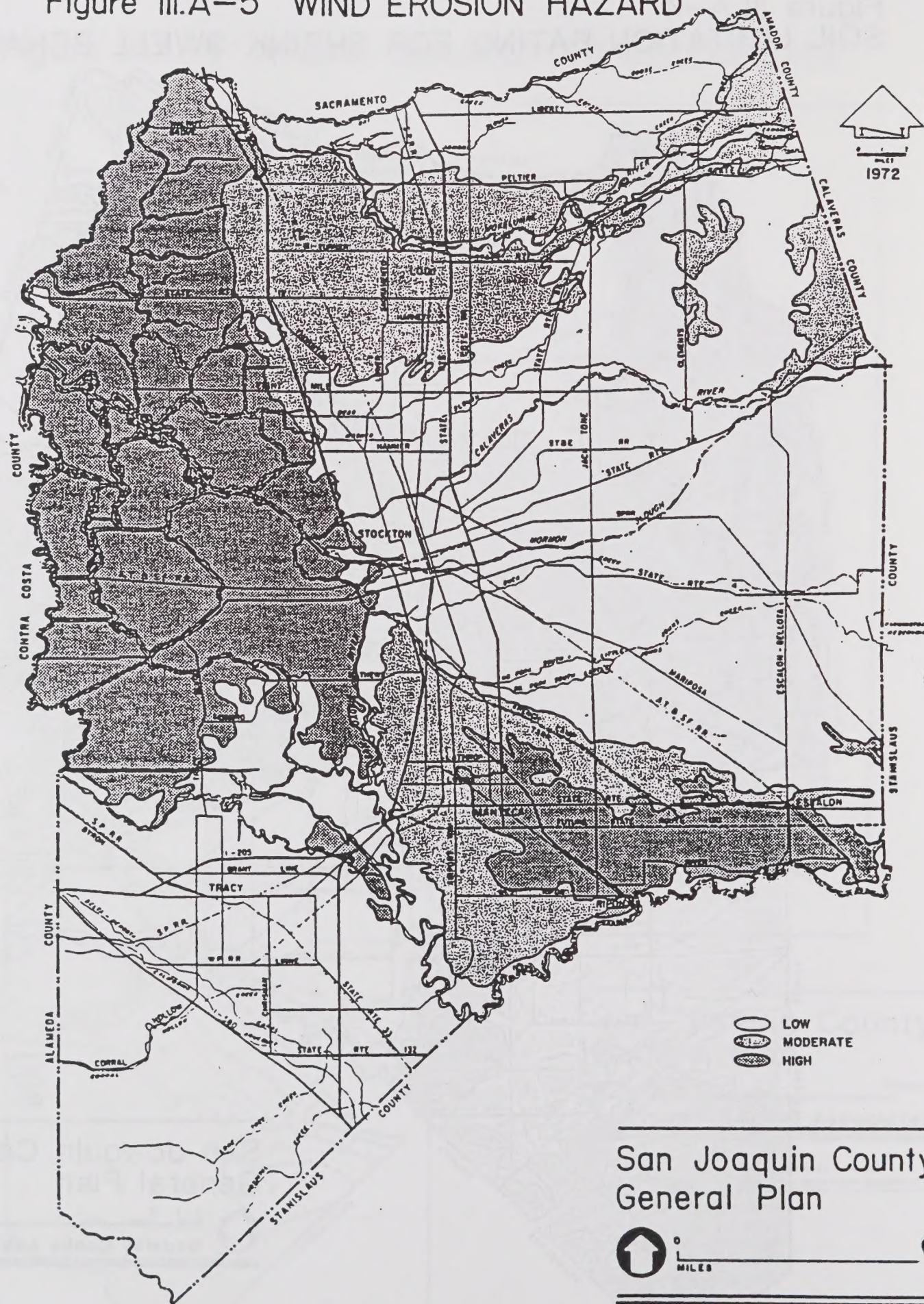


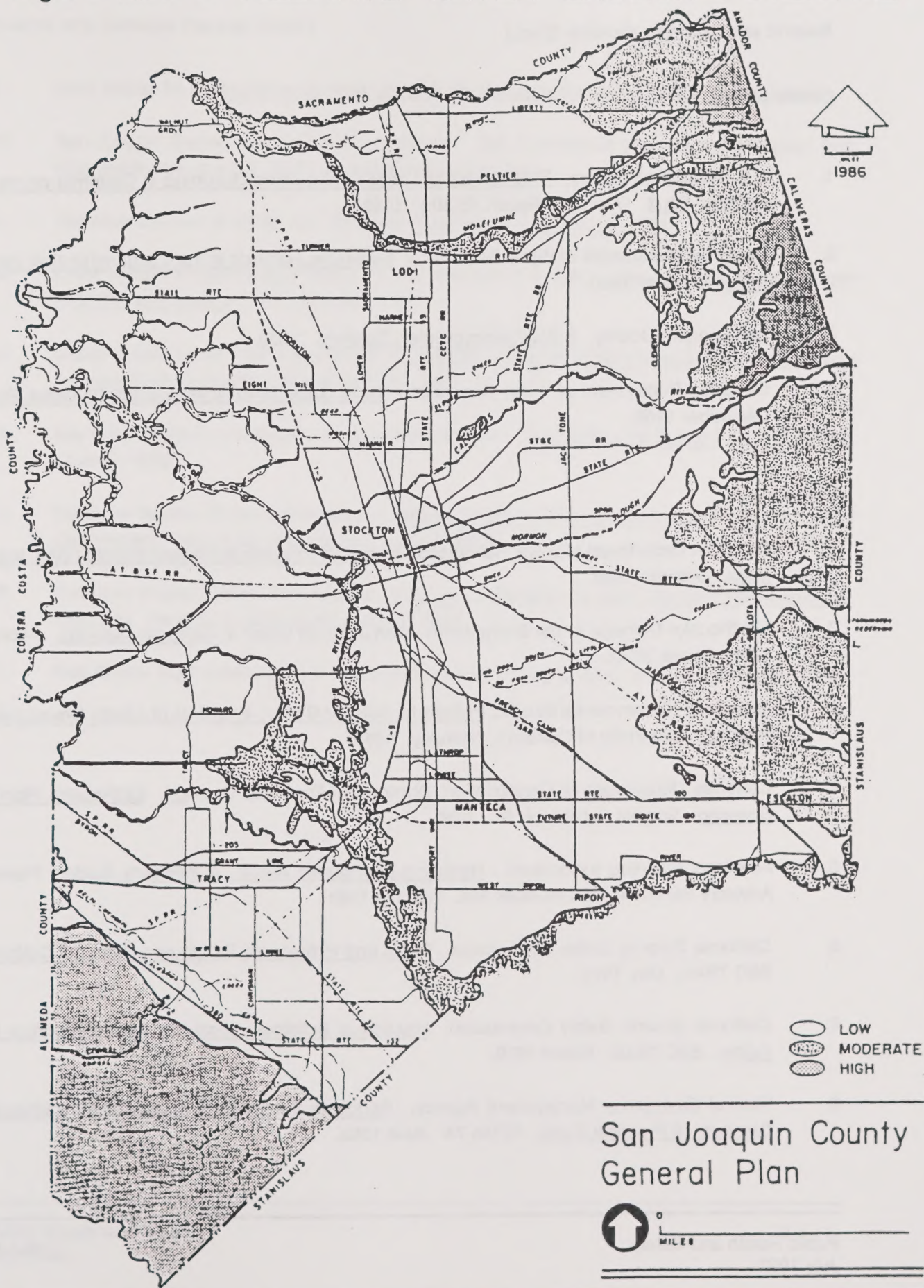
Figure III.A-5 WIND EROSION HAZARD



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General Plan



Figure III.A-6 RELATIVE WATER EROSION POTENTIAL



Endnotes

1. U.S. Geological Survey. Probabilities of Large Earthquakes Occurring in California on the San Andreas Fault. Open File Report 88-398. 1988.
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B. FLOOD HAZARDS

1. INTRODUCTION

Flood hazards in San Joaquin County are the result of either intense rain, snowmelt and cloudbursts, or failure of a flood control structure, such as a dam, levee, or drainage channel. All of the flowing streams in the County are directly or indirectly tributary to the San Joaquin River. These tributaries drain over 9,000 square miles in the foothills and the Sierras.¹ Consequently, San Joaquin County is subject to runoff from this large area and can be affected by events such as cloudbursts or snowmelt outside the County. Floods from rainstorms generally occur between November and April and are characterized by high peak flows of moderate duration. Snowmelt floods, normally expected between April and June, have larger volumes and last longer than rain flooding. As a result of intensive rainstorm or snowmelt, flooding in San Joaquin County can occur because of levee overtopping, levee failure, dam failure, and localized drainage problems (see Drainage section in Utilities Appendix).

A flood has many implications for public safety. Problems caused by flooding are many and include loss of life, displacement or complete destruction of buildings, siltation, temporary loss of utilities, road and bridge damage resulting in transportation slowdowns, loss of goods and services, and the threat of waterborne diseases. The initial force of floodwaters can cause significant property damage and loss of life. The movement of the water can also carry large objects which act as battering rams or can stack up and form dams creating additional flooding behind them. Finally, standing water can remain for long periods causing further property damage and creating health hazards. The costs associated with flooding, in terms of both private and public expenditures, are significant,² particularly in urban areas.

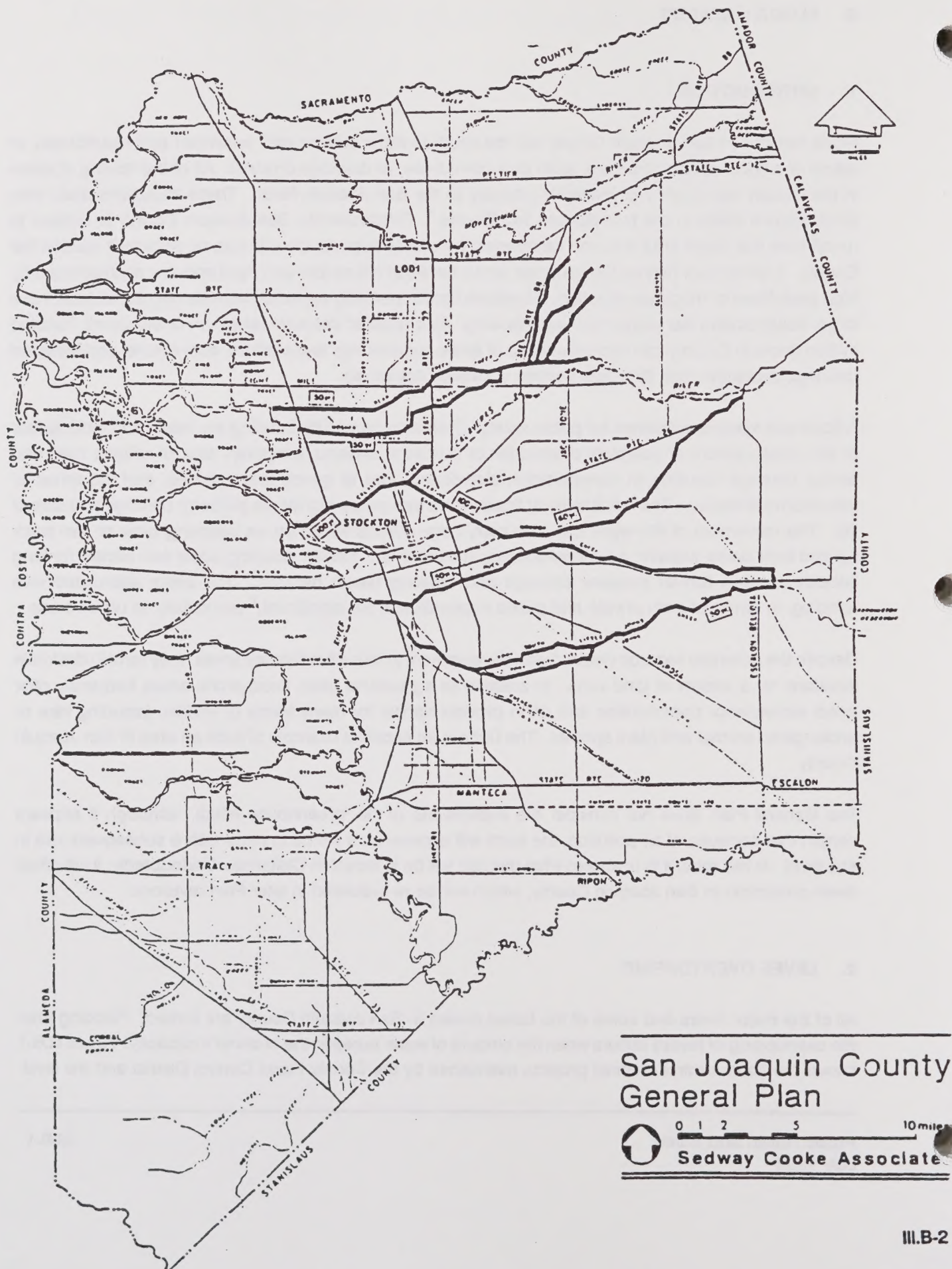
Despite the potential hazards involved with development in these flood-prone areas, they remain desirable locations for a variety of land uses. In addition to agricultural uses, flood-prone areas frequently offer good recreational opportunities and often provide habitat for many forms of wildlife, including rare or endangered animal and plant species. The Delta is an excellent example of such an area in San Joaquin County.

The General Plan does not consider the implications of the "greenhouse effect," although it appears certain that because of air pollution, the earth will experience a warming trend with a subsequent rise in sea level. At this time, it is unknown what this rise will be in Northern California. Undoubtedly, it will affect levee protection in San Joaquin County, which will be re-evaluated in later Plan revisions.

2. LEVEE OVERTOPPING

All of the major rivers and some of the lesser creeks in San Joaquin County are leveed. Flooding from the overtopping of levees occurs when the amount of water exceeds the channel's capacity. Figure III.B-1 shows the flood control channel projects maintained by the County Flood Control District and the level

Figure III.B-1 FLOOD CONTROL CHANNEL PROJECTS



of protection each provides. As shown, many of the channels provide protection from only 30- or 50-year floods (that magnitude of flooding expected on the average of once every 30 and 50 years, respectively). If floods of a magnitude greater than this occur, it is possible the levees will be overtopped.

In areas where urban development has or may occur adjacent to the channels, the feasibility of improving the levees to provide greater protection should be considered. Flood prevention standards should ideally require new levees to provide 100-year protection in agricultural areas.

3. LEVEE FAILURE

The prospect of levee failure is highest in the Delta, because these levees often contain unstable material and have been constructed on an unstable base. Many of the levees in the Delta were constructed of peat and silt. These materials are of low density, are highly compressible, and are structurally weak. When dried and exposed to air, peat soils oxidize and erode, which has led to continual subsidence of the levees and the island land surfaces. The subsidence of the land surfaces increases the water pressure on (and seepage through or under) the levees, frequently resulting in levee instability and failure.³

Levees in the Delta are classified into three categories: project, non-project, and direct agreement levees. Project levees, making up about 15% of the total system, were either built, rebuilt, or adopted as federal flood control project levees. They are maintained to federal standards by local districts. Non-project levees, representing 75% of the Delta levees, are privately constructed and maintained by the island landowners or local agencies. These levees are generally in poor condition and in need of rehabilitation. The remaining 10% of the levee system is maintained by local districts to federal standards. These direct agreement levees are either part of a navigation project or were rebuilt by the federal government after a flood.⁴

An inspection of non-project levees (those constructed and maintained by private interests or local reclamation districts) around 52 islands in the Delta was conducted in October 1980. The levees around four islands were rated "very poor," 28 were rated "poor" and 20 "fair." Dense vegetation on about 25% of the levees precluded visual inspections, making it impossible to detect areas which may be weakened.⁵ It should be noted that a levee of the Mokelumne River which was classified as "fair" by this inspection failed in February 1986.

Effects of Delta Levee Failure. Flood characteristics after a Delta levee failure vary. The greater the difference between the elevation of the watercourse and the island, the greater the height and velocity of flooding. A breach in a levee under non-flood conditions would be localized to the specific tract, while 100-year flood conditions could lead to levee failures on a series of Delta islands. An additional problem which may be created by a levee failure is the loss of evacuation routes, since in many instances, the only access routes may be roads constructed on top of the levees.

Because of the high cost and difficulty of repairing levee breaks, of protecting the insides of the flooded islands from wavewash, and of pumping out the floodwater, inundated areas which are not declared disaster areas and do not receive the associated federal and state financial assistance are more likely to remain permanently inundated. If levees fail and are not repaired, large areas could become open water surfaces. While these flooded islands could provide increased fish habitat and water surface for recreation, they could also create some negative impacts, including:

- Increased erosion from wind-driven waves and increased seepage to adjacent islands;
- Loss of agricultural land;
- Loss of wildlife food and habitat;
- On some islands, damage to urban development, disruption of highways, railroads and utilities; and
- Loss of freshwater through increased evaporation.⁵

Delta Levee Improvements A substantial investment in levee improvements needs to be made in the Delta. In 1982 the U.S. Army Corps of Engineers published a plan for Delta Levee Improvement.⁶ The findings of the report were substantially echoed by the State.⁷ Costs of a major levee rehabilitation program could exceed \$3 billion.^{6,7,8} Even with this investment, some levee failures will continue to occur. Because of the lack of funds and cost effectiveness of levee repair in the event of a failure, it is likely that some islands will remain permanently flooded.

Costs of any Delta levee program need to be shared among all the beneficiaries, including the private and public land-owners, all levels of government, recreationists, state and federal water projects, railroads, utility companies and the Ports of Stockton and Sacramento.

In any levee improvement program it is critical that the multiple Delta concerns be addressed and that adverse impacts of levee construction be mitigated. The following areas must be addressed in any adopted levee plan: water quality for agriculture and municipal use; restoration of the Bay-Delta fisheries; protection of San Francisco Bay and Suisun Marsh; support of Delta agriculture; conservation of fish, wildlife, vegetation and aesthetics; and maintenance of channels for shipping and recreational boating. Specific recommendations related to these concerns have been addressed in federal and state reports,^{5,6} and are concisely stated in a report by a Delta Task Force which was authorized by the State Assembly.⁷

Other Measures to Reduce Levee Failure Aside from levee improvements, other measures to reduce levee failures include restricting boating speeds,⁹ limiting removal of vegetation which serves to anchor levee soils,¹⁰ and adhering to agricultural practices which minimize subsidence.

4. DAM FAILURE

There are 15 major dams which have been identified as having the potential of inundating portions of San Joaquin County in the event of dam failure. Only three of these dams, Camanche, Camanche South Shore, and Farmington are located within the County. The Camanche Dam on the Mokelumne River has the potential of flooding an area from Clements to East Stockton in less than three hours. Despite the number of dams near San Joaquin County, the risk of flooding from dam failure is considered very low, because the likelihood of dam failure is low. A dam failure can occur as the result of an earthquake, as an isolated incident due to structural instability, or during heavy rains that exceed design capacity. Table III.B-1 summarizes the effects if the listed dams were to fail, and Figures III.B-2a through III.B-2h illustrate the areas affected.

The amended Dam Safety Act required that dam owners submit inundation maps to the California Office of Emergency Services for those dams whose total failure would cause loss of life or personal injury. This act also requires local jurisdictions to adopt emergency procedures for the evacuation and control of populated areas below such dams. The County Office of Emergency Services has prepared a Dam Failure Plan. This plan includes a description of the dams, direction of flood waters, responsibilities and actions of individual jurisdictions and evacuation plans.¹¹

5. FLOOD HAZARD AREAS

100-Year Floodplain. The boundary of the 100-year floodplain is the basic planning criterion used to demarcate unacceptable public safety hazards. The 100-year floodplain boundary defines the geographic area which would be inundated by a flood having a one percent (1%) chance of being equaled or exceeded in any given year. Outside this boundary, the degree of flooding risk is not considered sufficient to justify the imposition of floodplain management regulations, while inside the 100-year floodplain some level of regulation is required to protect public health, safety, and welfare. Figure III.B-3 shows the areas in the County generally affected by the 100-year flood.

The area of the 100-year flood is divided into a floodway and floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of development so that the 100-year flood can be carried away without substantial increases in flood heights. Development within the floodway reduces its flood water carrying capacity and increases flood heights, thereby increasing flood hazards beyond the border of the floodway. As a minimum standard, the Federal Emergency Management Agency (FEMA) limits increases in flood heights within the floodway to 1.0 foot provided that hazardous water velocities do not occur.

The area between the floodway and the boundary of the 100-year floodplain is termed the floodway fringe and encompasses the portion of the floodplain that could be used for development without increasing the surface elevation of the 100-year flood more than 1.0 foot at any point.

TABLE III.B-1: DAM FAILURE SUMMARY

Name of Dam	Location, County	Watercourse	Dam Type	Acre Feet	Owner	Est. Persons threatened	Area Affected	Time
New Hogan	Calaveras	Calaveras River	Earth & Rock fill	325,000	Corps of Engineers	208,500	Linden E. Stockton Stockton	1 hr 10 min. 2 hours 3 hrs, 20 min
Camanche	San Joaquin	Mokelumne River	Earth & Rock fill	431,500	East Bay M.U.D.	262,500	Clements Lockeford E. Lodi & E. Stkn	24 min. 1 hr 7 min 2 hr 53 min
Camanche South Shore	San Joaquin	Mokelumne River	Earth & Rock fill	230,978	East Bay M.U.D.	148,700	Clements Lockeford W. Lodi & W. Stkn	40 min 1 hr 20 min 6 hrs 40 min
Camanche North Dike	Calaveras	Mokelumne River	Earth & Rock fill	200,522	East Bay M.U.D.	48,000	Clements Bridge/Hwy 88 Brueila Rd. S.P.R.R.	47 min 2 hrs 5 hrs 13 min
Tulloch	Calaveras	Stanislaus	Concrete Gravity	68,400	Oakdale-S.J. Irrigation Dist.	10,700	Murphy Rd. Ripon W. Ripon	6 hrs 6 hrs 50 min 7 hrs 20 min
Jackson Creek	Amador	Jackson Creek	Earth & Rock fill	22,000	Jackson Valley Irrigation Dist.	425	Co. line & Dry Creek Elliot Rd. Mokelumne River	1 hr 7 min 5 hrs 8 hrs 40 min
Jackson Creek Spillway	Amador	Jackson Creek	Earth & Rock fill	46,894	East Bay M.U.D.	1,300	Co. line & Dry Creek Elliot Rd. @ Dry Creek W.P.R.R. near Thornton	1 hr 7 min 3 hrs 20 min 7 hrs
Farmington	San Joaquin	Littlejohn Creek	Earth fill	62,000	Corps of Engineers	550	Escalon-Belotta Rd. SR 4 & Hewitt Rd.	20 min 30 min

TABLE III.B-1: DAM FAILURE SUMMARY (Cont.)

Name of Dam	Location, County	Watercourse	Dam Type	Acre Feet	Owner	Est. Persons threatened	Area Affected	Time
Pine Flat Lake	Fresno	King River	Concrete Gravity	1,000,000	Corps of Engineers	3,800	Co. line & S.J. River I-5	73 hrs 20 min 80 hrs
Folsom & Nimbus	Sacramento	American River	Gravel fill	F. 1,010,000 N. 8,760	Bur. of Reclamation	70	N.W. County area	12 hrs
New Melones	Calaveras Tuolumne	Stanislaus River	Rock fill	2,400,000	Bur. of Reclamation	140,200	Escalon Manteca W. Stkn & Delta Islands	2 hrs 8 hrs 20 hrs
Pardee	Amador	Mokelumne River	Concrete Gravel	210,000	East Bay M.U.D.	52,200	Mackville Bridge, Clements Elliot Bridge, Lockeford Hutchins & Lodi Sta., Lodi	45 Min 1 hr 40 min 4 hrs 20 min
San Luis	Merced	San Joaquin	Earth fill	2,040,500	Bur. of Reclamation	28,000	So. Manteca I-5 @ S.J. River Bacon, Medford & Empire Islands	34 hrs 20 min 42 hrs 45 min 75 hrs 40 min
Salt Spring Reservoir	Amador	Mokelumne River	Rock Gravel	139,400	P.G. & E.	54,000	Clements Bridge & Hwy 88 Tully Rd. Thornton	3 hrs 5 hrs 6 hrs 22 min
New Exchequer	Merced	Merced River	Rock fill	1,024,000	Merced Irrigation Dist.	8,300	Co. line & Stanislaus River Lower Roberts & Union Islands Bacon & Upper Roberts Islands	10 hrs 7 min 18 hrs 14 min 20 hrs 44 min

Source: County and Cities Dam Failure Evacuation Plan, San Joaquin County Office of Emergency Services, 1977, 1978.
San Joaquin County Office of Emergency Services, Operations Officer, April 16, 1984.

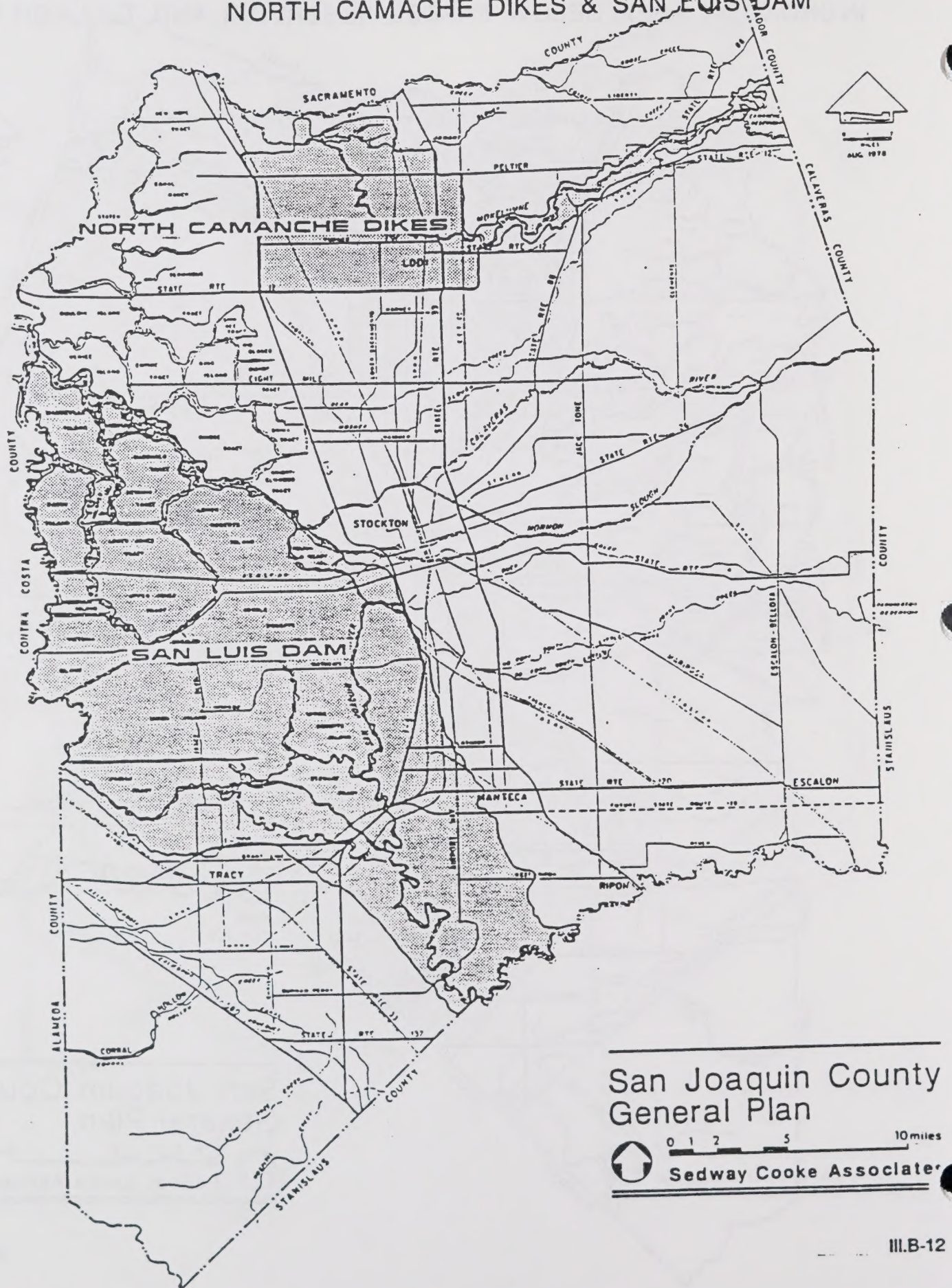
INUNDATION AREAS BELOW LAKE MC CLURE &
SALT SPRINGS RESERVOIR



BELOW PARDEE RESERVOIR



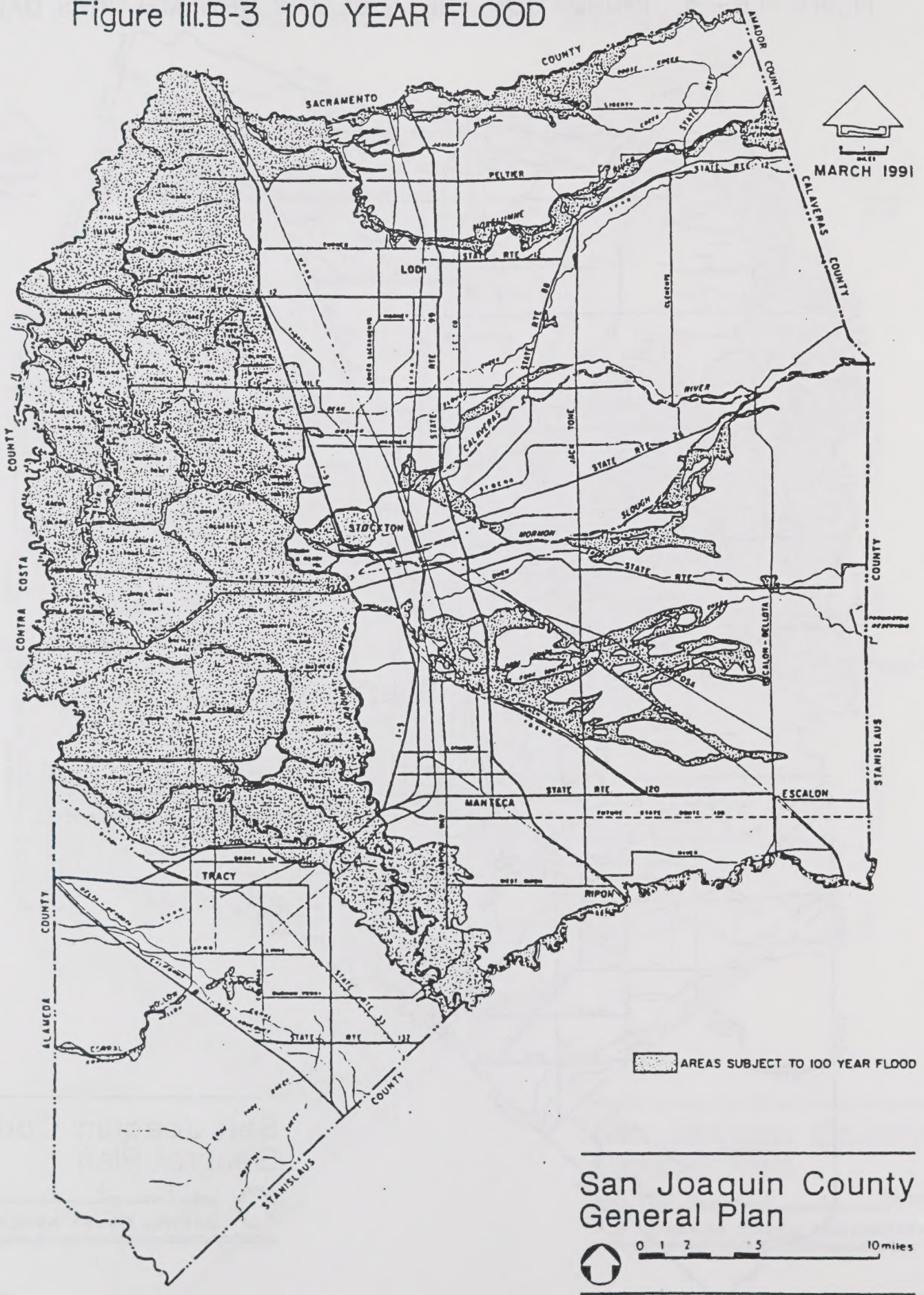
Figure III.B-2e INUNDATION AREAS BELOW
NORTH CAMACHE DIKES & SAN LUIS DAM



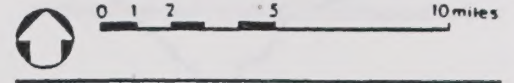
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Figure III.B-3 100 YEAR FLOOD



San Joaquin County
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Once the floodway and the floodway fringe have been distinguished within the 100-year floodplain, different development standards may be formulated for each area. These standards have two functions. First, they are designed to minimize loss of life and property damage by controlling the types of land uses which are permitted, and by prescribing certain construction methods. Second, they are intended to preserve the ability of the floodway to discharge the 100-year flood. Failure of floodplain regulations to recognize this latter function by prohibiting encroachment of the floodway will result in an increase in the geographic area of the 100-year floodplain.

County Areas Within 100-Year Floodplain. As indicated in Figure III.B-3 more than 35% of the County is subject to a 100-year flood. Land uses within the areas subject to the 100-year flood are primarily agricultural, although there are some exceptions. Some developed areas which are subject to the 100-year flood include portions of Stockton east of the Diverting Canal, some of the industrial areas adjacent to the Stockton Metropolitan Airport, the Taft residential area (south Stockton), and most of the communities of Farmington and Thornton.

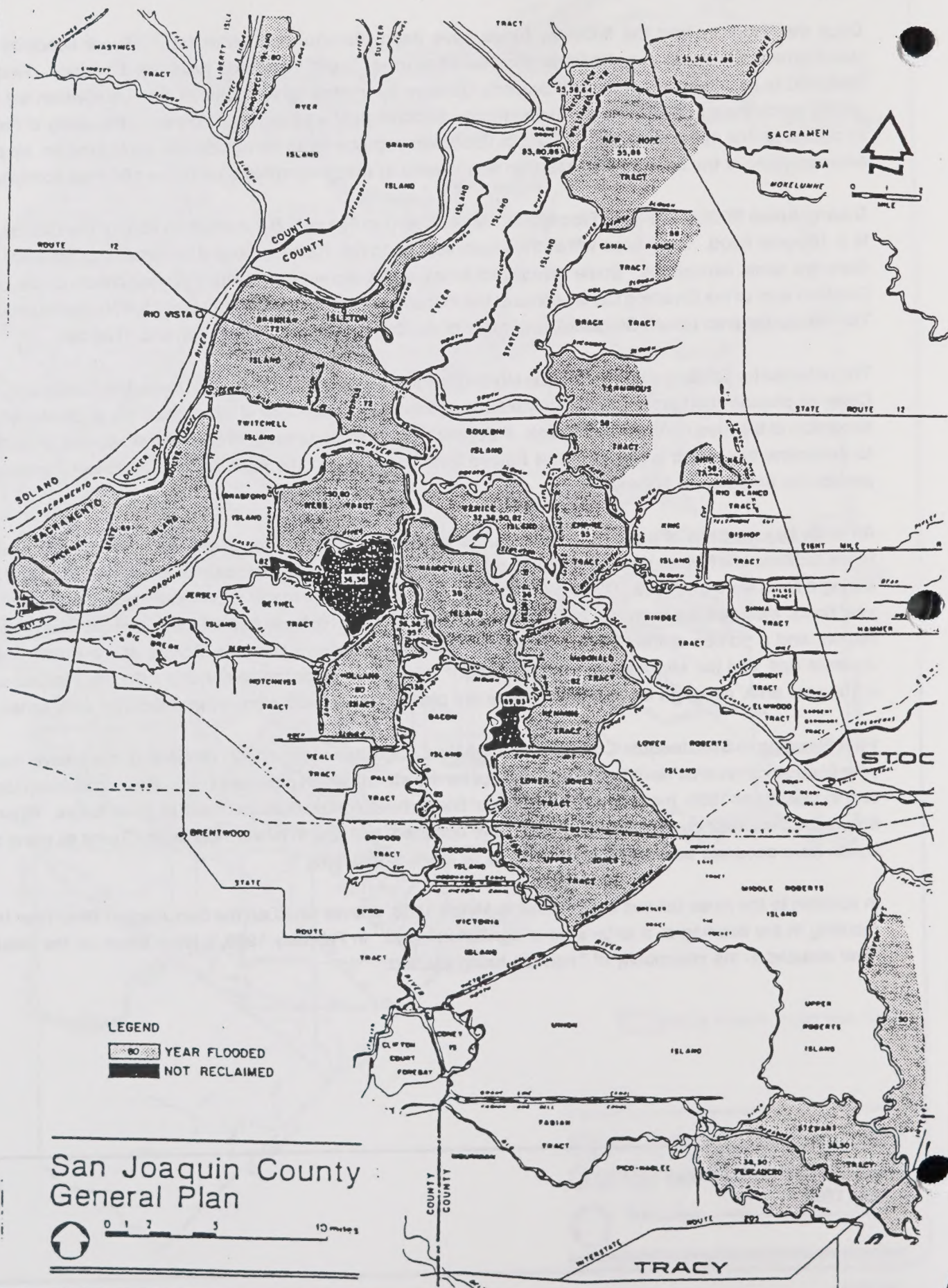
The potential for flooding also may exist in North Stockton. Levees along Five Mile Creek, Mosher Slough, and Bear Creek all provide flood protection for only a 50-year flood. The area around these channels is developed, with the exception of the area north of Bear Creek. If development is to occur north of Bear Creek, studies should be done to determine the extent of the potential hazard from flooding and the need for levee/channel improvements to protect the area from a 100-year flood.

An analysis was done of public and quasi-public facilities to examine their safety during a 100-year flood. Only those facilities which were determined to be critical based on the general importance of their function and their role during a flood were analyzed. Of the 373 facilities evaluated, 24 were found to be within the boundaries of the 100-year flood. Included among those 24 facilities were the California Highway Patrol Station, the Stockton Metropolitan Airport, and a portion of the County facilities on Matthews Road including the County Jail, a Sheriff Substation, Juvenile Hall, and the Migrant Farm Labor Camp.¹² New flood maps indicate that the County Hospital also is in a 100-year area, although levee improvements are planned that would protect these facilities on Matthews Road.

Past Flooding In San Joaquin County. Although the County has a long history of flooding, it has never had a 100-year flood since records have been kept. Except for the storms which occurred in November and December 1950, and in December 1955, most of the recent major floods have occurred as the result of levee failure. Figure III.B-4 shows the Delta Islands where levee breaks have occurred, resulting in Island inundation. Twice as many of these floods have occurred because of levee failures as levee overtopping.²

In addition to the levee failures in the Delta, in March 1983, a levee failed on the San Joaquin River near Vernalis, resulting in the flooding of a large area of agricultural land. In February 1986, a levee break on the Mokelumne River resulted in the community of Thornton being flooded.

Figure III.B-4 DELTA ISLANDS FLOODED SINCE 1930



6. FLOOD MANAGEMENT

No area can be completely protected from flooding. There are a variety of methods which can increase the level of protection, reduce the frequency of flooding, and reduce the damage when flooding does occur.

Flood Control Structures. In California, the emphasis for flood management has been historically on control of the water. These types of flood control projects include the construction of reservoirs in upstream areas which retain and gradually release water, the construction of levees which confine water to the channel or designated area, the improvement of channels to increase their water carrying capacity, and the establishment of bypasses or diversions.

All of the major rivers and most of the lesser creeks in San Joaquin County are leveed. Most of the levees are maintained by various reclamation districts, adjacent property owners, or the County Flood Control District. Some levees along the San Joaquin River are maintained by the federal government. Figure III.B-1 shows the flood control channel projects maintained by the County Flood Control District and the level of flood protection each provides. Table III.B-2 summarizes the flood control storage projects affecting flood flows in San Joaquin County.

Land Use Regulations. Even with the existence of flood control structures, flooding still occurs. Therefore, the regulation of land uses within areas subject to flooding is necessary to reduce injury and loss of life, to reduce structural damage caused by flooding, and to reduce public expenditures for additional flood control structures, emergency actions and post-disaster assistance. Land use regulations can be used to limit the uses allowed in an area and to apply special building requirements to reduce the damage from flooding for those structures which are allowed.

National Flood Insurance Program. San Joaquin County has been participating in the National Flood Insurance Program since 1973. This federal program is administered by the Federal Emergency Management Agency (FEMA). The primary benefit of participating in this program is that it provides an opportunity for property owners to purchase flood insurance if their community has made a commitment to implement floodplain management regulations which are specified by FEMA. Failure to implement these regulations could result in the County's suspension from the program.

Under the National Flood Insurance Program (NFIP), the County is required to regulate for 100-year flood protection. A 100-year flood is considered a severe flood, but one with a reasonable possibility of occurrence for purposes of land use planning, property protection, and human safety. The Corps of Engineers, under contract to FEMA, prepared a flood insurance study report² and a series of maps which depict the location of the 100-year flood, flood elevations, floodways, 500-year flood boundaries, and flood insurance rate zones. The original work was completed in 1977, and additional hydrologic and hydraulic analyses were undertaken, especially in the Delta, in 1988.

TABLE III.B-2
FLOOD CONTROL STORAGE PROJECTS AFFECTING FLOOD FLOWS IN
SAN JOAQUIN COUNTY

<u>Name</u>	<u>Stream</u>	<u>Operating Agency</u> ¹	<u>Flood Control Reservation</u> (acre-feet)		<u>Status</u>
			<u>Rainflood</u> <u>Season</u>	<u>Snowmelt</u> <u>Flood Season</u>	
Camanche Reservoir	Mokelumne River	East Bay Municipal Utility District	200,000	200,000	Completed in 1964
New Hogan Lake ²	Calaveras River	COE	165,000	- ³	Completed in 1964
Farmington Dam	Little Johns Creek	COE	52,000	- ³	Completed 1951
New Melones Lake	Stanislaus River	Bureau of Reclamation	450,000	450,000	Operational in 1978, Complete in 1979
New Don Pedro Reservoir	Tuolumne River	Local Interest Group ⁴	340,000	1,000,000	Completed in 1971
Lake McClure (New Exchequer Lake)	Merced River	Merced Irrigation District	350,000	400,000	Completed in 1966
Buchanan Dam (H.V. Eastman Lake)	Chowchilla River	COE	45,000	- ³	Operational in 1975; Completed in 1977
Hidden Dam (Hensley Lake)	Fresno River	COE	65,000	- ³	Operations in 1975; completed in 1977
Millerton Lake (Friant Dam)	San Joaquin River	Bureau of Reclamation	170,000	390,000	Completed in 1949
Pine Flat Lake	Kings River	COE	475,000	1,000,00	Completed in 1954

¹ Rules and regulations for flood control operation of the projects shown are prescribed by the COE regardless of the operating agency (Section 7, 1944 Flood Control Act - Public Law 78-534).

² The present project involved enlargement of an existing reservoir owned and operated by the City of Stockton.

³ Not Applicable.

⁴ The city and county of San Francisco and the Turlock and Modesto Irrigation District.

Source: Federal Emergency Management Agency, Flood Insurance Study, San Joaquin County, Unincorporated Area, July 4, 1988.

Two methods of study were used by the Corps in preparing the maps. In all known flood hazard areas and areas of projected development through 1992 the detailed method was used. Hydrologic analyses were conducted, using the Corps of Engineers standard project rainfall and flood concept, the unit hydrograph method of analysis, statistical analysis of streamflow data, and consideration of current operating criteria for upstream reservoirs. Hydrologic analyses required for the mapping involved 10- year, 50-year, 100-year and 500-year flood data for streams.

Other areas (along the AT&SF canals, Corral Hollow Creek, Coyote Creek, Dry Creek, Lone Tree Creek, Mokelumne River, North Fork Mokelumne River, and Stanislaus River) were studied using the approximate method, which consisted of inspections and topographic analyses. These areas were judged to have a low development potential or minimal flood hazards. Recent studies have looked at the Delta levees in terms of their condition and more stringent criteria which require three feet of freeboard from the 100-year flood elevation to the top of the levee instead of the one-foot of freeboard previously required. Most of San Joaquin County has not been reevaluated using this new freeboard criterion.

Ordinance Requirements. San Joaquin County regulates for the 100-year flood through the use of its Development Code. Within designated floodways, no new structures are permitted except such things as bridges, railroads, pipelines, accessory structures, launching ramps and structures associated with marinas (if no alternative location outside the floodway is available). Structures within floodways are limited so that obstructions are not created, the possibility of floating materials is reduced, and the flood will not be increased. In flood fringe areas, cemeteries or landfills are not allowed. All new residential structures and substantial improvements to existing residential structures are required to have the lowest floor elevation twelve inches above the 100-year flood elevation. New non-residential buildings must either meet these requirements or provide an alternative method of floodproofing which is certified by a registered architect or engineer and approved by the County Building Inspector.

Public Information. An important part of flood management is the provision of flood information to the public. Individuals can receive information regarding the flooding potential on a piece of property, the depth of flooding, and the flood insurance rate zones. Also, if adequate information is not available, the County will work with the U.S. Corps of Engineers to try to get additional information.

Emergency Preparedness. San Joaquin County has established procedures for response in the event of an emergency, including a flood. Two of the objectives of the Emergency Plan are to save lives and protect property, and to repair and restore essential systems and services. This is accomplished by the coordination of all agencies involved in the emergency and the provision of information.¹³

Another aspect of emergency preparedness is the evacuation plan. Evacuation plans are required for existing mobile homes, mobile home parks, or recreational vehicle parks which are located within a floodway. They are also required for existing or new recreational vehicle parks located within flood fringe areas. Existing mobile home parks within flood fringe areas do have the option of providing ground anchors to be used as tie downs for the mobile homes instead of evacuating. The purpose of the evacuation plans is to show how the mobile homes and recreational vehicles will be evacuated if a flood occurs.

Endnotes

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C. FIRE SAFETY AND LAW ENFORCEMENT

1. FIRE SAFETY

The function of a fire district/department can be divided into at least eight parts:

- 1) firefighting,
- 2) fire prevention,
- 3) maintenance and upkeep of equipment,
- 4) medical emergency response,
- 5) inspections,
- 6) training of personnel,
- 7) education and fire prevention programs, and
- 8) unique emergency response (e.g., automobile accidents, drowning).

From a land use planning standpoint, firefighting, medical emergency response, inspections and unique emergency response are the primary areas of interest. The degree of fire protection which an individual property or an area receives is dependent upon a number of factors: fire protection regulations, capability of the department (personnel and equipment), adequate water availability, accessibility to the fire and response time. These factors are also considered by insurance companies in determining fire insurance rates. It is often found that the cost of providing a higher degree of protection is offset by the reduction in the cost of fire insurance.

Fire Protection Regulations. The County adopts the latest published Uniform Fire Code (UFC) regularly. Within the Uniform Fire Code, two substantial requirements are relevant to land use. The first is the requirement for improved access roads for firefighting equipment. All new buildings must have an all-weather surface access not less than 20 feet wide with adequate turning radius for firefighting equipment. Dwellings and agricultural buildings may be exempted from this requirement by the County Fire Warden if it is determined that firefighting or rescue operations would not be impaired.

Secondly, new buildings are required to provide an approved water supply adequate for fire suppression.

The water can be supplied by water mains, reservoirs, pressure tanks, or cisterns. Dwellings outside of urban or rural communities (as identified in the County General Plan) are exempt from this requirement. Agricultural buildings 5,000 square feet or less and agricultural buildings over 5,000 square feet that do not cause an exposure hazard to neighboring buildings or property are also exempt.

In addition, a County Sprinkler Ordinance has been adopted because many of the local fire districts have inadequate water supplies and personnel to place major hose stream into operation. The County Sprinkler Ordinance was adopted to reduce, on initial response, the impact large buildings would have on the fire districts. The Sprinkler Ordinance requirements specify the buildings which must have automatic sprinkler systems.^{1,2}

Fire Protection Agencies. Fire protection within San Joaquin County is provided primarily by city and special district fire departments. Wildland fires in the Coastal and Sierra Nevada foothills are the

responsibility of the California Department of Forestry (CDF), while local military and institutional facilities provide their own internal fire protection. The Stockton Metropolitan Airport provides airport crash and rescue operations at the airport and has mutual aid agreements with neighboring districts.

City fire departments (Stockton, Lodi, Tracy, and Manteca) provide urban fire protection within their respective incorporated areas. In addition, Stockton provides contract fire service to the Lincoln, Tuxedo-Country Club, and Eastside Fire Districts. Two fire departments (Escalon and Ripon) are "consolidated fire districts" which provide fire protection to their respective incorporated cities and surrounding rural areas. Three fire districts (Boggs Tract, French Camp, and Montezuma) provide fire protection within unincorporated fringe areas of Stockton, while the remaining 13 fire protection districts provide fire protection to the outlying small communities and rural areas. Figure III.C-1 indicates fire district boundaries and Table III.C-1 lists particulars of each district/department.³

All public fire protection agencies in San Joaquin County operate under a master mutual aid agreement. When a fire agency's normal facilities are exhausted, other fire departments are called in to provide assistance (or to provide backup service) at no charge to the responsible fire agency. In addition to mutual aid, local fire agencies are also incorporated into the Emergency 911 system. Many also participate in arson investigation and weed abatement programs through the County Fire Warden's office.¹

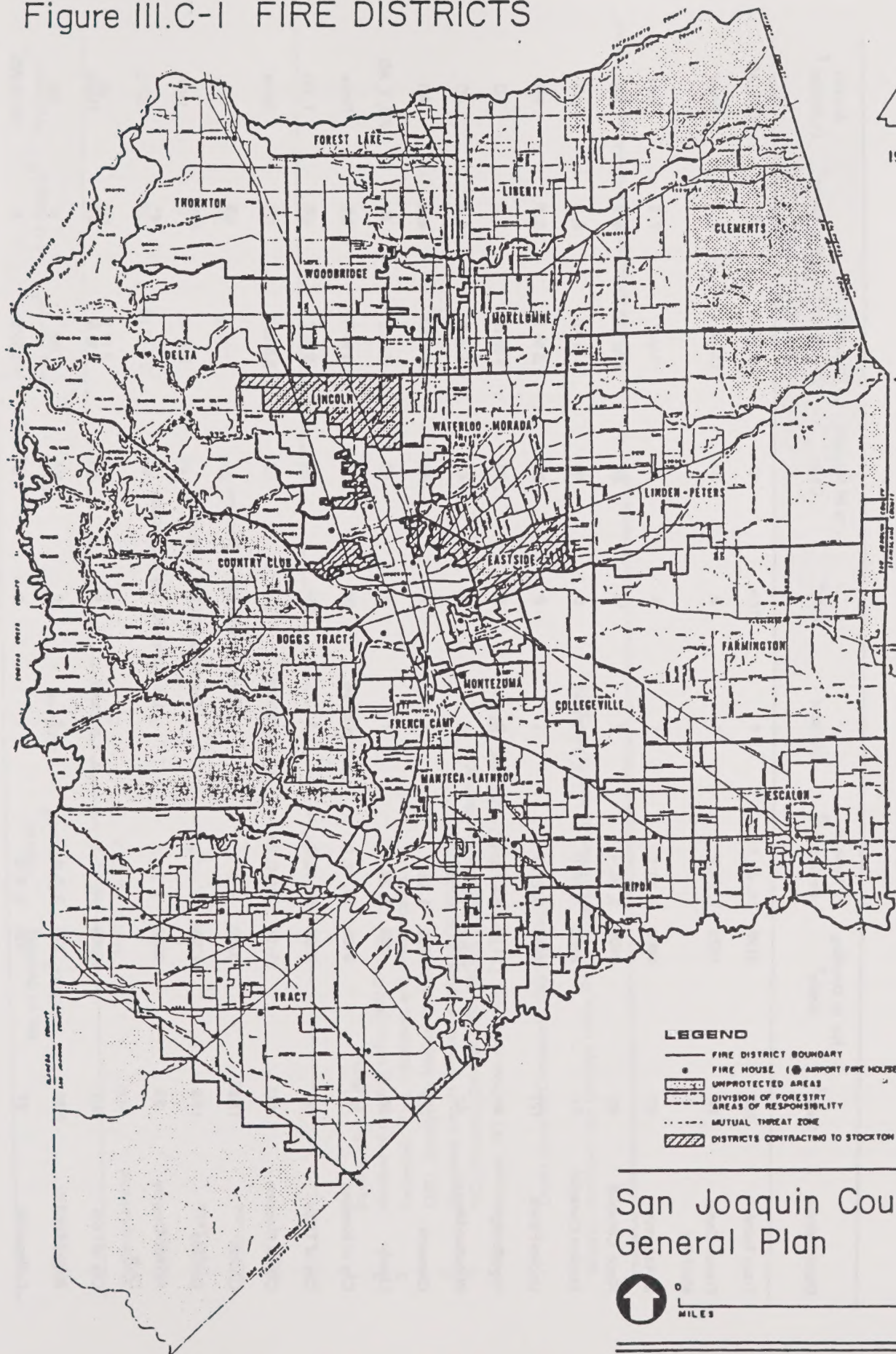
Fire Protection Problems. Problems faced by firefighters in rural areas include water availability, response time, accessibility, and coverage.

Fireflow Capabilities. Since every County rural fire district is an independent district, each sets its own standards for manpower and equipment according to its needs and budget. All of the San Joaquin County rural fire districts take some water along when responding to fire calls. The amount of water available for fireflow varies in each district and varies from first response to backup response.

The County Fire Warden has, as part of the County Fire Code, prepared a publication titled "Determining Required Water for Fire Suppression in Urban and Rural Areas Not Served by Public Water Systems."¹ Generally, water requirements are based on a formula of cubic foot of building area divided by occupancy hazard class to obtain the total water supply needed. Exceptions are provided for one and two family dwellings, agricultural buildings under 5,000 square feet and agricultural buildings over 5,000 square feet that do not create a hazard to neighboring buildings or property.

Fireflow within public water systems also varies. Historically, fire districts used whatever water was available from a public water system. Standards exist within firefighting publications to make estimates of fireflow requirements based on a coefficient related to type of construction and total floor area of buildings being considered. Fireflows usually are between a minimum of 500 gallons per minute (gpm) to a maximum of 8,000 gpm. Many of the County fire districts would like the ability to supply a minimum of 2,000 gpm for a two hour period for fire protection. Public water systems are reviewed by the County Fire Warden, in urban areas, to assure that the system is adequate for fire protection.^{1,4,5}

Figure III.C-1 FIRE DISTRICTS



1991

TABLE III.C-1: FIRE PROTECTION DISTRICTS

District Name	Size ¹	No. of Dwelling Units ²	Type of Personnel ³	Stations	EMT ⁴	% of Medical Calls	Response Time Range ⁵	I S O Rating ⁶	Access Problems ⁷
Tracy Rural	220	3120	16, 20, 1	4	16+	45	5 to 10-15	8	RD, T, AD
French Camp McKinley	18	1879	7, 11, 2	1	2	70	1.5 to 4	6, 9	None
Mokelumne	62	1862	4, 20, 0	1	3	43	4 to 7	7, 8	None
Ripon Consolid.	45	2404	5, 50, 4	2	16	80	5 to 10	4, 8	AD
Escalon Consolid.	64	2872	1, 29, 0	1, 1 planned	0	50	6 to 15	8, 9	AD
Linden-Peters	127	1480	8, 27, 1	1	6	60	1.5 to 18	6, 8	AD
Woodbridge	64	2110	13, 15, 3	2	8	60	3 to 15	5, 8	AD
Waterloo-Morada	42	39999	13, 15, 0	2	2	47	4 to 6	5, 8	AD
Clements	115	593	1, 25, 1	1	7	45	5 to 13	8, 8	AD
Liberty	38	876	3, 20, 0	1	3	45	4 to 8	8	RD, T, AD
City of Manteca	7	9197	24, 12, 2	3, 2 planned	30	80	3 to 5	5/9	None
City of Tracy	9	6827	24, 18, 2	3	18+	85	3 to 7	4/9	T, AD
City of Stockton	43	55194	234, 0, 20	12, 2 planned	234	57	3.5 to 9	1/9	None
Lincoln	17.3	3112		Contracts with City of Stockton				1/9	
Eastside	11.2	6701		Contracts with City of Stockton				6/8*	
Tuxedo-Country Club	2	3538		Contracts with City of Stockton				4*	
City of Lodi	9.3	12989	42, 12, 5	3, 1 planned	5	50	3 to 5	3/9	None
Boggs Tract	1	279	3, 0, 0	1	0	NA	NA	9	NA
Collegeville	27	332	0, 9, 0	1	0	0	5 to 8	9	RD, T, AD
Farmington	100	517	1, 25, 0	1	3	70	1 to 15	7/9	None

TABLE III.C-1: FIRE PROTECTION DISTRICTS (Cont.)

District Name	Size ¹	No. of Dwelling Units ²	Type of Personnel ³	Stations	EMT ⁴	% of Medical Calls	Response Time Range ⁵	I S O Rating ⁶	Access Problems ⁷
Manteca-Lathrop	100	4401	20, 22, 3	3	26	60	3 to 7	6/8	AD
Thornton	43	544	1, 25, 0	1	1	60	3-7 to 15	7/8	AD, T
Forest Lake	14	445	0, 14, 0	1	2	50	2 to 12	8	None
Montezuma	12.5	1831	4, 9, 1	1	2	50+	2 to 5	7/9	AD
Delta	94	District Being Formed							

¹ Square miles in district.

² Number of dwelling units, 1980 Census.

³ Personnel: Paid, volunteers, and administrative.

⁴ EMT: Emergency Medical Technical.

⁵ Response time in minutes; average run to longest run.

⁶ ISO, Insurance Services Office fire rating, dwelling classification.

⁷ Access: RD = Road conditions; T = Turn-around; AD = Address display.

* Under study by Commercial Risk Services, Inc.

Source: Interviews with District's chiefs, Public Protection Manual, 1980 U. S. Census.

Response Time. Response time is the length of time required by firefighters and equipment to respond to a reported fire or other emergency. Within San Joaquin County, response time can vary from one minute to 18 minutes because of the availability of paid or volunteer firefighters, distance to the call, ability to locate the fire, and the conditions on the roads such as traffic, vehicle parking and railroad grade crossings.⁶

Response times tend to be longer in the rural fire districts which rely heavily on volunteers. These rural districts usually have one or two fire stations to serve a large district with scattered rural homesites throughout.

Accessibility. The response time is partially affected by the accessibility to the fire. Most County-maintained roads are adequate for rapid arrival of firefighting equipment. Existing private roads, however, may not be. Some existing homes in rural areas are located on dirt or gravel roads which are not passable during the rainy season. While enforcement of the UFC will eliminate this problem for new residences, it is not retroactive to existing residences.

Finding the fire may itself be difficult. Flag lots are confusing and structures in rural areas can be very difficult to locate. Locating the fire can be made easier if care is given to subdivision design, street naming and numbering, and placement of address numbers at the roadway.

Unprotected Areas. Since the Delta Fire Protection District, serving the North Delta, was formed, the Southern Delta remains the only major portion of the County without some type of fire protection. In the South Delta, fire protection is a private, individual responsibility. An exception is when a fire threatens County property (bridges, roads, ferries) and the County Public Works Department responds with personnel and equipment.

There is no urban development in the South Delta, and none is planned, although there are more than \$10 million in residential, agricultural and recreational improvements. State Route 4 passes through the unprotected Delta area for 14.5 miles. It is expected that recreation development, highway travel, and waterway traffic will continue to increase, thereby increasing the need for fire protection.

Fire protection in the Delta needs to be both land and water based. Reports prepared by the County Fire Warden detail the problems of Delta fire protection and examine various alternatives for protection. Costs of providing fire protection can be partly offset by lower insurance rates.¹

Fire Hazards In San Joaquin County. Fire potential for wildlands is based on three major factors, fuel load, climate, and topography. Natural or wild vegetation is the major source of fire fuel in wildland fires. The quantity of available vegetation determines the intensity of a fire. Types of fuel loads are classified into three categories:

- Light (grasses). The lightest fuel load burns easily but is the easiest to control. It includes areas dominated by grasses, annual herbs, and barren land.
- Medium (shrubs). Medium fuel loads include areas dominated by brush, shrubs, and other perennial vegetation less than six feet in height.
- High (woods and brushwood). A high fuel load area is dominated with vegetation six feet or more in height. These areas are the hardest to start burning but due to the heavy fuel load they are the hardest to control once on fire. The combination of temperature, wind, low relative humidity, and seasonal lack of precipitation provides the conditions for critical fire weather. All wildlands in California experience critical fire weather to some degree.

Topographic influences on fire hazard increases with the degree of slope. Steep slopes cause fires to burn faster up hill, increase travel time, and reduce accessibility for emergency equipment. Thus, as slope increases, the ability to control a fire decreases.

As a general rule, wildland fire hazards do not preclude development, but they do require development to meet special standards corresponding with each degree of risk. The San Joaquin County and the California Division of Forestry have prepared fire safety standards for subdivisions in wildland hazard areas. These development standards address access, road widths, bridges, building construction, vegetation clearing, and hydrant and water systems.

Wildland Fires. Wildland fires are an annual hazard in San Joaquin and account for more than half the fires occurring in the unincorporated areas. Wildland fires burn natural vegetation on undeveloped lands and include rangeland, brush, and grass fires. Where there is easy human access to dry vegetation, fire hazards increase because of the greater chance of human carelessness. Human activities such as smoking, debris burning, and equipment operation are the major causes (90%) of wildland fires. Lightning causes the remaining wildland fires. In addition, long, hot, and dry summers with temperatures often exceeding 100°F add to the County's fire hazard.

High hazard areas include outlying residential parcels, open lands adjacent to residential areas, and unirrigated parklands. The grass-covered, dry grazing lands of the eastern and southwestern foothills have a high potential for large-scale fires. The degree of hazard in these areas depends on temperature, moisture, wind, the amount of vegetation, slope steepness, accessibility to human activities, and accessibility of firefighting equipment.

Even in developed areas, wildland fires are hard to control. Although adequate firefighting equipment and personnel may be available, residential areas require the use of firefighting techniques unlike those used in rural areas. Structural fires are extinguished with large amounts of water, whereas wildland fires are controlled by containing the blaze and allowing the flames to die out. In order to protect vulnerable

buildings from wildland fires, firefighting resources are often spent protecting the structures rather than controlling the fire. This frequently results in larger, more costly fires with greater destructive potential.

Peat Fires. Peat lands of the Delta are hazardous fire areas. Peat fires can be caused by discarded cigarettes and matches, by agricultural burning, or by spontaneous combustion of the continuously decomposing organic matter. A fire in peat soil can burn underground and can continue to smolder for months, erupting unpredictably even after the fire is presumed to be extinguished. Even flooding of the land may not put out the fire. In addition to the fire hazards, burning peat can create voids beneath the ground surface, which can cause the ground surface to sink or collapse.

Chemical Fires. The manufacture, storage, handling, or transportation of petroleum explosives, or other flammable or hazardous materials create special fire hazards. It is critical that the local fire departments be aware of the types and locations of these materials.⁷ The County Emergency Services Department is preparing a plan for emergency response in the event of a hazardous materials accident.⁸

During an emergency, immediate identification of hazardous materials is needed by firefighters. One method of identification is the National Fire Protection Association's 704M hazardous materials marking system. This system consists of blue, red, and yellow diamond signs. Each contains a number from zero to four indicating the relative severity of health, flammability and detonation hazard. A white diamond indicates special considerations such as the presence of water-reactive substances, oxidizers, or radioactive materials. The 704M system provides a simple means of conveying comprehensive information at a glance.

Future Needs. Fire service has traditionally been financed by property tax revenues. Since enactment of Proposition 13 and Proposition 4, fire district financing has become more difficult. Fire districts are now financed through property taxes modified by the state special district augmentation fund and property tax overrides passed by the district's voters. Fire districts in San Joaquin County have been authorized to collect impact fees on new development.

2 LAW ENFORCEMENT

Law Enforcement Services. Law enforcement in San Joaquin County is provided by cities in their incorporated areas and by the County Sheriff's Department in the unincorporated areas. In addition to their regular highway-related duties, the California Highway Patrol maintains routine patrols and investigates traffic accidents on public roads in unincorporated areas. All law enforcement agencies participate in mutual aid agreements.

The County has a large unincorporated population (112,353 people in 1980, representing 23% of the total County population) which is protected by the Sheriff's Department. The Sheriff's Department Patrol Division is located, along with the jail facilities, on Matthews Road, west of French Camp. There are no

substations; however, programs for patrol have been instituted on a district basis. Presently, there are eight districts in the County served by 96 District Deputies and 16 Community Car Deputies. There are no plans to construct substations due to their substantial costs; however, there are plans for improvements to the French Camp facility by the mid 1990s

There is additional patrol in several of the unincorporated communities. The Sheriff's Department has established a "Community Car" program in Woodbridge/Thornton, Lockeford/Clements, Linden, French Camp, Lathrop, Escalon, Manteca/Ripon, and Tracy. The Community Car program is staffed by 16 Community Car Deputies. A car is assigned to each of these areas, ten hours per day. This allows for more rapid response to calls and additional time for patrolling these communities. These community car areas also receive patrol coverage by district officers on a 24 hour basis when available. The availability of officers on patrol is normally controlled by the functional needs of other duties performed by the Sheriff.

The Sheriff's Department also staffs a County Communication Center which operates on a 24 hour basis, affording fire department radio dispatch service to 17 rural fire departments, including the cities of Ripon and Escalon, Medi-Flight dispatch for San Joaquin County, and dispatches ambulances for the unincorporated area by telephone. Staff within the center are trained in emergency medical dispatch which provides instructions to ill or injured citizens prior to ambulance or paramedic arrival. Emergency communications are based on "enhanced 9-1-1," centralizing communications for the unincorporated area of San Joaquin County.

The Government Code describes the duties of the Office of Sheriff-Coroner. The duties include acting as bailiff in the Superior Court, maintaining a jail, and preserving the peace. As Coroner, certain deaths as defined in the Health and Safety and Government Codes of the State of California receive investigation to determine cause. Each coroner investigation provides a death classification through the result of investigation and/or inspection or autopsy. The coroner investigation includes security and disposition of the decedent's remains and property.

The Sheriff also provides service of civil process as required by law which includes court orders, general summons, various types of writs and civil warrants of arrest. This activity entails garnishments, levies, evictions and repossession of certain properties which many times are auctioned by the Civil Division at a later date.

The Sheriff's Department staffs a Boating Safety Division which provides enforcement on 600 miles of waterways within the County. Our natural recreational and sporting environment attracts thousands of people annually, both from the local area and from throughout the State.

By authority and responsibility, the Sheriff's Office is designated as "scene manager" in any disaster, from hazardous toxic spills to major flood activity. Public protection plans are coordinated with other public agencies in preparation of such disasters.

Rural Levels of Service. The Sheriff's Department is funded to provide local police protection throughout the County's unincorporated area. There were approximately .75 officers providing patrol services per 1000 residents in 1987. Staffing is the key problem in providing police protection, and the Sheriff's Department has recommended that the ratio of officers be increased to at least 1 officer per 1000 residents. The currently low ratio is mainly due to the increased growth without an equivalent increase in patrol and support services. An increase in the officer/population ratio will not be possible without a substantial increase in cost. The increased cost of police protection may be difficult to justify countywide since financing of the Sheriff's Department is borne by all County residents, not just those in the unincorporated areas.

The time it takes for an officer to respond to a call is the "response time". Factors that affect response times include the number of officers on duty, the size of the patrol area and the density of the population served, the distance to the call, the level of traffic congestion, accessibility, and the number of incidents occurring at the same time. Generally, the Sheriff's Department will respond to a non-emergency call within one hour. If an officer has not arrived within that time, the dispatch office will call back to keep the party advised on arrival times.

Another factor affected by the lack of adequate staffing is the ability of the Department to do routine patrolling. At the present time, the service provided by the Sheriff's Department is based primarily on response to calls. With the personnel currently available there is only very limited routine patrolling on a countywide basis. The primary exceptions to this are in the areas served by the Community Cars, where routine patrolling does occur.

In some of the cities, irregular jurisdictional boundaries result in duplication of services, which is costly in terms of both time and money. The County could conceivably work out a contractual agreement with the cities to service the unincorporated areas within or adjacent to the incorporated boundaries, however, such an agreement has not been made due to the cost. Another solution would be to consolidate city boundaries through annexations so that irregular patrol routes are reduced or eliminated.

The irregular jurisdictional boundaries also can cause confusion and delay in responding to emergency calls. However, with implementation of the 911 emergency telephone number and its "automatic line identification," the location of the call can be pinpointed automatically in case the caller cannot provide the precise location.

A related problem is the expense involved in servicing scattered urban or haphazard fringe area development. It is inherently more expensive to protect residents in small scattered urban pockets (or "islands") and fringe areas surrounded by a city jurisdiction than it is to provide similar service to an area with orderly outward growth.

Crime Rates. Statistics on the County crime rates are kept by the Crime Records Division of the Sheriff's Department and reported to the State Department of Justice.

Crime Prevention Through Physical Planning and Design. Citizen action has been shown to be an effective means of crime prevention. Citizen action can be facilitated by the creation of "defensible space." Defensible space is a concept of designing buildings and neighborhoods to achieve the following objectives:

- o To promote the proprietary interest of residents in neighborhood or apartment complex activities;
- o To permit the identification of suspicious happenings or persons; and
- o To make it evident to potential criminals that they could be observed and apprehended.

Defensible space design features can be incorporated into residential, commercial, industrial, or recreational development. Examples of design features include:

- o A visually well-defined separation between public and private areas;
- o Windows located for easy resident surveillance of yards, corridors, entrances, streets, and other public and semi-public places;
- o Landscaping which permits surveillance of open areas and entryways and does not provide places for concealment; and
- o Well-lighted streets, entrances, and address numbers.

The Sheriff's Department Crime Prevention Unit staff has been trained in security and the "defensible space design concepts." They will be included in the development review process to comment on these issues. If residential and commercial building occurs in the unincorporated areas of the County with law enforcement issues in mind, the Sheriff's Department feels it can reduce the numbers of calls for service of particular kinds, i.e., burglary, robbery, theft, vandalism and nuisance.

Crime Prevention Programs. Some of the defensible space principles are difficult to apply to low density residential areas or semi-rural areas where the desired lifestyle requires features which separate each home from others and from the road. Having the primary living areas of a home located to provide easy resident surveillance of adjacent residences, driveways, and the roadway is a defensible space principle which works in the rural areas. In addition to this, citizen action can be channeled into Neighborhood Watch or similar programs. These programs are intended to encourage acquaintance among neighbors, foster an attitude of caring for neighboring property, promote permanent identification marking of household items, and encourage the display of signs indicating valuable items have been marked. All the jurisdictions (County and Cities) which have implemented the Neighborhood Watch program feel it

is effective and point to localized reduction in crime. There is a marked increase in calls to law enforcement agencies from residents reporting suspicious circumstances.

Demand for Future Services. The demand for additional police services will inevitably rise as the County's population continues to grow. Increased population and tourism will require additional personnel, facilities and equipment. Increased traffic volumes will result in more accidents, more auto-related violations, and greater responsibilities for the Sheriff Department and the California Highway Patrol.

To assure adequate law enforcement services, there should be 1.5 line officers assigned to patrol duty per 1,000 residents in urban communities and one line officer assigned to patrol duty per 1000 residents in the remaining unincorporated portions of the County. As the County attracts new industry, there could be additional variation in the types of crime committed, including increased vandalism, equipment theft, and "white-collar crime." Crimes against property, theft, burglary, vandalism, and arson are expected to increase with the population. Typically, these types of crimes can be reduced through more aggressive patrol, police visibility, and crime prevention programs, such as Neighborhood Watch programs. Crimes against persons, such as rape, murder, or assault, are more spontaneous; thus less affected by patrol. Crimes against persons, however, can also be expected to increase with the growing urban population.

To help assure adequate law enforcement services, funding mechanisms may need to be established to help pay for facilities and services. The County may need to consider the implementation of impact fees to offset the increased costs of providing public safety services brought about by new development.

There are also major difference between emergency calls in urban and rural areas. While urban calls deal with neighborhood disputes, noise, parties, juvenile complaints; calls from rural farm areas often deal with suspicious vehicles and persons. Furthermore, residents moving to the County from more urban areas may have higher expectations for response time. Unless the function of the department is changed, it will be very difficult to meet these changing expectations and conditions.

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D. NOISE

1. INTRODUCTION

Three aspects of environmental noise are important in determining subjective response: the intensity (amplitude) or level of the sound, the frequency spectrum of the sound, and the time-varying character of the sound. The combination of these three dimensions produces what we hear. The intensity of sound, measured in decibels (dB), is a measure of how loud the sound is. In technical terms, it represents the sound pressure produced by the sound waves emitted from some source. Sounds that are barely perceptible correspond to 0 dB. The sound levels associated with common noise sources and their effects are presented in Table III.D-1.

The frequency of a sound refers to the number of complete pressure fluctuations per second. The variation in frequency is what allows us to distinguish a shrill whistle from a dull roar. Frequency is measured in terms of cycles per second (cps) or Hertz (Hz). Our normal hearing ranges from about 20 to 20,000 Hz or, roughly, from the lowest note on a great organ pipe to the highest note on a violin. Our ears are less sensitive to sounds of high and low pitch; thus, very high and very low notes sound fainter than a sound in the middle of the audible range, even if all are of equal strength (same dB levels).

Finally, how we perceive sound depends on its time-varying characteristics. Continuous sounds are those produced by sources which emit the sound for relatively long periods in a constant state, such as a waterfall. Intermittent sounds are those produced for short periods, such as during school recess, light traffic, and an occasional aircraft flyover. Impulsive sounds are those produced in an extremely short span of time, such as a gunshot.

2. NOISE MEASUREMENTS

Because hearing varies widely between individuals, what may seem loud to one person may not to another. Although loudness is a personal judgment, precise measurement of sound is made possible by use of the decibel scale, which measures sound pressure or energy according to international standards. The decibel scale is logarithmic (based on powers of ten) and not linear, like a ruler. Therefore, a small increase in decibels represents a great increase in intensity. The sound intensity multiplies by 10 with every 10-decibel increase, but the perceived sound to an observer increases two-fold.

Because the ear is less sensitive than measuring instruments to sounds of very high and low frequencies, decibel measurements are weighted to correspond more closely to what the human ear hears. The most common adjustment is the "A" weighting, denoted as dBA. Measurements in dBA offer good indications of the intensity of sound but do not account for the duration aspect of noise.

TABLE III.D-1: TYPICAL SOUND LEVELS FOR COMMON NOISE SOURCES

QUALITY OF SOUND	SOUND LEVEL, dBA	TYPICAL SOUNDS
UNCOMFORTABLY LOUD (THRESHOLD OF PAIN)	130	
	120	Jet takeoff at 200 feet Thunder
	110	Rock band
VERY LOUD	100	Power lawn mower
	90	Diesel bus at 15 feet Motorcycle at 25 feet
	80	Inside sports car, 55 mph Garbage disposal at 3 feet
LOUD	70	Freeway traffic at 50 feet
	60	Vacuum cleaner at 10 feet Inside department store
QUIET	50	Normal conversation Quiet street
	40	Average residence Quiet room
VERY QUIET	30	
BARELY AUDIBLE	20	Whisper at 5 feet
	10	Leaves rustling
THRESHOLD OF HEARING	0	Mosquito at 3 feet

Several systems have been devised to reflect the variation in noise over time. The Community Noise Equivalency Level (CNEL) provides an average equivalent A-weighted sound level for a 24-hour day. The day is divided into day, evening, and night, and noises occurring during the evening and night periods are weighted upward to reflect that they are more disturbing than daytime noises. The day-night average level, Ldn, is a similar descriptor of average sound level during a 24-hour period, although it does not include a separate evening period in its adjustment of average sound level (evening noises are weighted the same as daytime noises).

Other common measures used to describe the time-varying character of environmental noise include the statistical noise descriptors, L10, L50, and L90. The L10 is the A-weighted sound level equal or exceeded during 10% of a stated time period, typically 24 hours. The L10 is considered a good measure of the "average peak" noise. The L50 is the A-weighted sound level that is equaled or exceeded 50% of a stated time period. The L50 represents the median sound level. The L90 is the A-weighted sound level that is equaled or exceeded 90% of a stated time period and is commonly used to describe background, or ambient, noise.

Because it is often cumbersome to describe the noise environment with these statistical descriptors, a single number descriptor called the Leq is widely used. The Leq is defined as the equivalent steady-state sound level which in a stated period of time would contain the same acoustic energy as the time-varying sound level over the same time period. The Leq is particularly useful in describing the subjective change in an environment where the source of the noise remains the same but there is change in the level of activity. Widening roads and/or increasing traffic are examples of this kind of situation. For highway noise environments, the Leq during the peak traffic hour is approximately equal to the Ldn.

3. RESPONSES TO NOISE

The effects of noise on people can be listed in three general categories: subjective effects of annoyance, nuisance, and dissatisfaction; interference with activities such as speech, sleep, and learning; and physiological effects such as startle and hearing loss.

Subjective Effects. A large number of factors govern how annoyed people become by noise. First, there are characteristics of the noise itself; i.e., its loudness and duration, whether it is impulsive or steady, whether it contains music or piercing "pure tones." Second, background noise levels help determine how "intrusive" and thus annoying a particular noise is. Third, the place, time of day, and seasonal variations can make a difference. Finally, a person's total exposure to the noise source and personal attitude affect the tolerance for noise.

Various studies of community responses reveal the following implications of changes to ambient noise levels:

- Except in carefully controlled laboratory experiments, an increase or decrease of only one dBA cannot be perceived;
- Outside of the laboratory, a three dBA is considered just noticeable;
- An increase or decrease of at least five dBA is required before any noticeable change in community response would be expected; and
- A ten dBA increase is subjectively heard as a doubling in loudness and would almost certainly cause adverse change in community response.

It has been demonstrated that if a noise problem is allowed to occur, a reduction in noise of 5-10 dBA more than would have been required in the design stage is often necessary to appease complaints. For this reason, it is very important to consider noise control early in the development of a project.

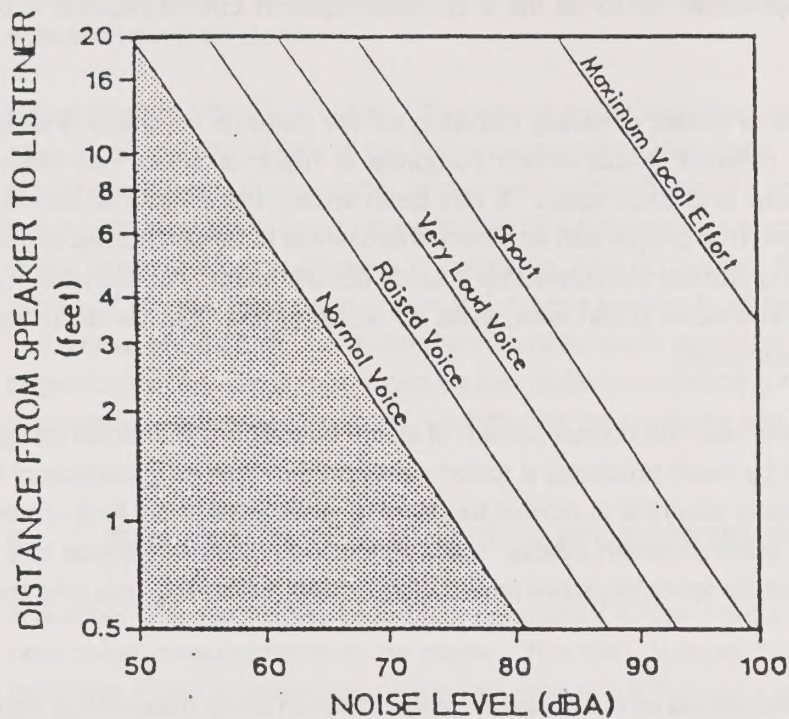
Interference with Activities. Noise can disturb and impede activities ranging from speech communication to sleep to performance and learning.

Speech Communication. People generally have the ability to hear and distinguish one sound from a background of sounds. For example, one can often hear the telephone ringing over a background of music and conversation. However this ability has definite limitations. Unwanted sound can interfere with the perception of desired sounds or signals; this interference is called masking. Masking can render a sound or signal inaudible or unrecognizable. Masking becomes a serious problem when background noise interferes with perception of speech. Accurate speech communication is crucial to formal education, occupational efficiency, family revelations, and the overall quality of human life. This function may be lost or severely diminished in noisy situations.

Background noise that interferes with speech can adversely affect the development of social and working relationships in adults. In language studies people have found to vary their voice levels and distances in accordance with the level of background noise, physical convenience, and cultural standard. Person-to-person distances of less than 4-1/2 feet tend to be reserved for confidential or personal conversations, usually with a lowered voice, while distances greater than about five feet are usually associated with public messages delivered with a raised voice. Therefore, levels of background noise requiring the distance between talker and listener to be less than four feet may discourage communication and be upsetting to persons not intimately associated. Similarly, there will be great reluctance to raise the voice to deliver a personal message even if this is necessary for speech intelligibility.

Face-to-face personal conversations at the usual distance of about five feet can proceed in A-weighted noise levels as high as 66 dB (see Figure III.D-1). In many conversations involving groups of people, distances between speaker and listener of five to twelve feet are common, and the level of the background noise should be less than 50 to 60 dBA. At public meetings or outdoors in parks, yards or playgrounds,

Figure III.D-1: Voice Levels and Speech Communication



Area Where Face-to-Face Communications Are Possible with "Normal" Speaking Voice

Source: U.S. Environmental Protection Agency, Fundamentals of Noise: Measurement, Rating Schemes, and Standards, December 1971, p. 29.

where distances between talker and listener range from twelve to thirty feet, the A-weighted sound level of background noise should be kept below 45 to 55 dB, if practical speech communication is to be possible.

Sleep. Sleep is a complicated series of states, generally following similar patterns in people of all ages. The amount of time spent in the different states which comprise a night of sleep vary from the drowsy/awake state to the deep sleep and back again. It has been widely observed that sound can interfere with any of sleep's stages and that people can acclimate themselves to certain noises and sleep through them. It is possible that only unfamiliar environmental sounds disturb sleep. For example, a rural person may have difficulty sleeping in a noisy urban area, while an urban person may be disturbed by the soft nighttime sounds of the countryside.

Intermittent noises of sufficient intensity alter the normal pattern of sleep, usually in the direction of lighter sleep. Long-term sleep disturbance by noise produces a "poor" sleep pattern with long periods of light sleep and frequent awakenings. Sleep is essential to normal functioning while awake, but loss of normal sleep has not been shown to cause adverse health effects. Most people can eventually adjust to a disturbed sleep pattern and compensate by spending more time in deep sleep, becoming less responsive to external stimuli, or by napping.

No range of noise levels has been established as the minimum range at which sleep disturbance occurs. As a person experiences the deepening stages of sleep, the threshold of noise perception becomes higher. For instance, in the second stage of sleep ("moderate"), a noise 30 to 40 dBA above a person's threshold of hearing while conscious will be required to wake that person; in deep sleep a noise must reach levels 50 to 80 dBA above that threshold to wake the person. Of course, very loud, brief noises (with sound levels of 100-120 dBA) will wake nearly everyone from any stage of sleep.

Performance and Learning. Noises seemingly begin to interfere with human performance above 90 dBA. High frequency noise (above 1000-2000 Hz) or irregular bursts of noise are more distracting and may produce more performance interference than low frequency noise or steady noise. The performance of tasks demanding accuracy or having a complex series of steps is most likely to be adversely affected, without necessarily reducing the total amount of work performed. Learning, especially in small children, can be seriously hindered by the presence of high or constant levels of background noise, since the noise can be a barrier to speech perception and exchange (as previously mentioned). For children, this interference may have far-reaching detrimental effects, because speech communication is extremely important to developing language and reading skills.

Noise effects on human performance can be grouped in three classes: arousal, distraction and specific effects. Arousal of bodily systems can result either in detrimental or beneficial effects on human performance, depending upon the nature of the task and the person's state prior to the exposure. For example, noise might induce muscular tension which could interfere with delicate movements, while a sleepy person might be beneficially aroused by the noise and perform more effectively in noise than in

quiet. Distraction has been defined as lapse or diversion of attention from the task at hand, and most often is the result of annoying characteristics of a noise. Specific effects including masking and muscular activation such as startle.

Physiological Effects of Noise. The sound levels associate with environmental noise, in almost every case, produce effects only in the first two categories described. Yet, at any given sound level, individual responses will vary considerably, and physiological effects of a transient or possibly persistent nature may result. Brief sounds at levels exceeding 70 dBA can produce such physiological responses as constriction of the blood levels and changes in breathing, size of pupils of the eyes, and gastric secretions. Steady noises of 90 dBA have been shown to increase tension in all muscles, and influence the response time in a simple choice task. Long-term exposure to levels exceeding 70 dBA can cause hearing loss. While physiological arousal by noise can be beneficial in maintaining response to possible danger, continuing unnecessary arousal to irrelevant sounds can be annoying and possibly damaging to general health.

4. DESCRIPTION OF COMMUNITY NOISE ENVIRONMENTS

A number of noise studies have been conducted in San Joaquin County, so that it was not essential for new noise measurements to be made. The San Joaquin County Council of Governments has had extensive noise assessments performed; first, in 1978 when a comprehensive effort was undertaken to identify noise sources and noise sensitive uses by community, and second, in 1985 when current and projected noise contours were prepared for specific roads, railroads, and airports throughout the County. In addition, each of the cities in the County is in the process or has recently completed its General Plan update, which contains descriptions of their noise environments. Finally, a noise/land use compatibility study is being prepared for Stockton Metropolitan Airport.

As part of the 1978 effort, day and night background noise levels were measured at 165 sites throughout the County.¹ The background noise levels in residential neighborhoods are usually a function of traffic noise, except for isolated instances where industry or transformer noise sets a high steady background level. In the County, neighborhoods closest to high-volume freeways tend to have the highest levels (44-47 dB); larger urban areas with many traffic arterials, the next highest levels (40-45 dB); small urban communities with only one or two major roads, lower levels (34-37 dB); and country areas, the lowest levels (29-37 dB).

In commercial and industrial areas, background levels were higher, due to high traffic volumes from nearby major roads, parking lot activity, industrial blowers, fans, and heavy equipment. The daytime average background levels for commercial areas (56 dBA) and industrial areas (55 dBA) are not atypical for such land uses throughout the State. These background noise levels are well within suggested State guidelines for compatible noise/land use environments.

The 1978 COG study estimated the number of people who were exposed to noise levels greater than 60 dB. About 7% of the population resided in areas exposed to an Ldn level of 60-65 dB, considered conditionally acceptable according to State guidelines. About 12% of the population was exposed to noise levels of 65-69 dB, again conditionally acceptable. Approximately 3% of the population resided in areas considered normally unacceptable for residential development, 70-74 dB. Finally, one-half of 1% were found to live in noise exposure areas that were clearly unacceptable, 75 dB or greater. The number of affected residents has certainly increased since 1975; however, it may not be significantly greater for two reasons. First, the primary source of noise is traffic. In order to perceive a noticeable change in noise levels, traffic volumes must generally double, and very few roads in the County have experienced that magnitude of increase since 1975. The few exceptions include portions of SR 12, I-5, Harney Lane, Eight Mile Road, and Hammer Lane. Second, unless the new development has occurred adjacent to the road right-of-way, noise levels reduce dramatically when shielded by other buildings. The following community noise characterizations are drawn from the COG 1978 study, unless more recent data were available.

Stockton.¹ Stockton is most affected by noise from I-5, the railroads, and SR 99. Several noise sensitive land uses, including schools, hospitals, convalescent hospitals, and rest homes, lie within high noise areas. Nearly 25% of the Stockton Planning Area population was exposed to noise levels of 60 Ldn or greater in 1975. The total number affected (over 39,400) was more than the rest of the County combined. Some areas of Stockton experience noise from Stockton Metropolitan Airport.

Lathrop. Lathrop residents are affected by noise from Interstate 5 and from railroad operations on the Southern Pacific Railroad tracks. In addition, a report prepared by the Federal Government and information from various environmental impact reports from recent Lathrop area projects, identifies helicopter overflight patterns over residential and commercial areas which result in noise levels which exceed county noise standards (65 dB CNEL at property line).

Tracy.² Tracy is a relatively quiet community. Major noise sources include traffic from I-205, Eleventh Street, MacArthur Drive, and Tracy Drive, and railroad noise from the Southern Pacific and the Western Pacific. As of 1981, nearly 2,500 persons, or about 13% of the population, resided within the 60 Ldn.

Escalon.¹ Although located away from the County's freeways, the city is bisected by SR 120 and the Santa Fe Railroad, the latter being the dominant noise source. The number of residents within the 60 Ldn of the railroad in 1975 was about 1,010. It is expected that a similar number are affected presently since train operations have not changed significantly, and the population has remained fairly constant.

Ripon.³ Ripon is primarily affected by vehicular traffic from SR 99 and railroad operations on the Southern Pacific Railroad, with some impact from aircraft training operations from Stockton Airport. Numerous residents and two schools lie within the 65 CNEL contours of SR 99 and the railroad.

Manteca.⁴ The dominant noise sources in Manteca are highway traffic and railroad operations on the Southern Pacific Railroad. Vehicular noise along SR 99 and 120, Yosemite Avenue, Main Street, Louise Avenue, and Airport Way commonly exposed adjacent parcels to CNEL levels of 65-70 dB. During the passage of individual trains, noise levels are about 78 dBA at a distance of 100 feet from the tracks.

Lodi.⁵ As with all other communities in San Joaquin County, highway traffic is the dominant noise source, although railroad noise affects the central and eastern parts of Lodi. Daytime noise levels along major roadways generally vary from 55-65 dB, partly because of high traffic volumes and partly because of high percentages of truck use. These levels were observed along SR 99, Cherokee Lane, Turner Road, Stockton Street, Kettleman Lane, Ham Lane, Lodi Avenue, and Hutchins Street. A small number of residential and office uses are affected by noise levels that are conditionally acceptable. Noise monitoring along the Southern Pacific Railroad showed a value of 82 dB at a distance of 100 feet.

Unincorporated Area outside the Stockton Planning Area.¹ Noise levels away from the freeways were quite low. The greatest number of affected residents were found along major County roads (over 3,000); railroads and SR 99 each affected about 1,000-1,200; and other State Routes affected about 1,700.

5. NOISE CONTOURS

Under contract to the COG, BBN Laboratories, Inc. prepared contours for 1985 for the year 2005 for the County's major roads, railroads, and airports. Noise levels are measured in terms of CNEL, which is commonly used throughout the State as a measure of 24-hour noise exposures. The material presented below is drawn from that document,⁶ unless otherwise noted.

Major Roads. BBN used the Federal Highway Administration Traffic Noise Prediction Model to produce noise contours for the County's roads. The model incorporates assumptions regarding average daily traffic volumes, the percentage of trucks, and the average speed. The model assumes no blockage of line-of-sight between roadway and observer; however, BBN adjusted the contours to reflect the presence of open, low density buildings or high density buildings. The model is based on traffic volumes projected to the year 2005. Although the General Plan assumes a planning horizon of 2010, it is not expected that the contours would vary much from those projected for 2005. This results from the logarithmic relationship between traffic volumes and noise levels: an error in traffic estimates of 10% would result in less than a 0.5 dB error in noise level; an error of 100% would result in a 3 dB error in noise level, an amount just perceptible to the human ear. The projected CNEL contour distances in 1985 and 2005 for Lodi are presented in Tables III.D-2A and III.D-2B; for Manteca in Tables III.D-3A and III.D-3B; for the unincorporated areas in Tables III.D-4A, III.D-4B, and III.D-4C (Mountain House); for Stockton in Tables III.D-5A and III.D-5B; and for Tracy in Tables III.D-6A and III.D-6B.

Railroads. Noise levels for trains take into account the noise level of the vehicles as well as the duration of the signal during the vehicle passby. Present and future levels of operation were sought from representatives of the Union Pacific, Southern Pacific, and Atchison, Topeka and Santa Fe companies. The projected CNEL contour distances are shown in Tables III.D-7A and III.D-7B.

Airports. Noise exposure maps, based on existing and projected aircraft operations, were prepared for Kingdon Airpark, Lodi Airpark, Lodi Airport, New Jerusalem Airport, Tracy Municipal Airport, and Stockton Metropolitan Airport. Noise levels were projected using a model developed by BBN for the Air Force and require data regarding type of aircraft (business jet, 2-engine propeller, 1-engine propeller, and helicopter); type of operations (takeoffs and landings); runway usage and flight track location and utilization; and time of operations. Figures III.D-2a through III.D-7 illustrate the projected CNEL contours for 1985 and 2005.

**TABLE III.D-2A:
PROJECTED CNEL CONTOUR DISTANCE FOR LODI, 1985**

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Century	Ham	Church	Both	0	0	0	16
Cherokee	Harney	Kettleman	Both	0	23	92	243
	Kettleman	Vine	Both	0	35	120	302
	Vine	Lodi	Both	0	41	132	330
	Lodi	Lockford	Both	0	43	136	337
	Lockford	Turner	Both	0	33	106	264
Elm	Lower Sac.	Mills	Both	0	0	0	4
	Mills	Ham	Both	0	0	14	41
	Ham	Hutchins	Both	0	0	5	26
	Hutchins	Church	Both	0	0	0	13
	Church	Cherokee	Both	0	0	0	4
Ham	Turner	Lockeford	Both	0	4	25	59
	Lockeford	Lodi	Both	0	5	27	62
	Lodi	Kettleman	East	0	5	27	62
	Lodi	Kettleman	West	0	0	34	111
	Kettleman	Century	Both	0	0	6	50
	Century	Harney	Both	0	0	4	25
Harney	Lower Sac.	Ham	Both	1	17	50	121
	Ham	SPRR	North	2	11	26	49
	Ham	SPRR	South	0	2	20	59
	SPRR	SR 99	Both	1	17	50	121
Hutchins	Harney	Century	Both	0	14	43	88
	Century	Kettleman	Both	0	18	78	208
	Kettleman	Vine	Both	0	13	40	83
	Vine	Lodi	Both	0	0	2	19
	Lodi	Elm	Both	0	10	29	59
	Elm	Lockeford	Both	0	0	10	28
Kettleman	Lower Sac.	Mills	Both	18	61	156	359
	Mills	Ham	Both	7	58	168	407
	Ham	Hutchins	Both	6	57	166	402

TABLE III.D-2A: (Cont.)
PROJECTED CNEL CONTOUR DISTANCE FOR LODI, 1985

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Kettleman (cont.)	Hutchins	Church	Both	16	78	212	501
	Church	Cherokee	Both	0	40	130	324
	Cherokee	SR 99	Both	0	27	102	263
Lockeford	Mills	Ham	Both	0	0	18	46
	Ham	Hutchins	Both	0	3	23	54
	Hutchins	Church	North	0	18	65	166
	Hutchins	Church	South	6	22	48	89
	Church	Cherokee	North	0	17	58	146
	Church	Cherokee	South	7	22	46	84
	Cherokee	Cluff	Both	0	3	24	70
Lodi	Lower Sac.	Mills	Both	0	11	30	61
	Mills	Ham	Both	1	21	52	102
	Ham	Fairmont	Both	5	26	60	114
	Fairmont	Hutchins	Both	3	24	57	110
	Hutchins	Stockton	Both	8	31	69	128
	Stockton	Cherokee	Both	4	25	57	108
	Cherokee	Cluff	Both	0	0	10	58
Lower Sac.	Turner	Yosemite	East	10	26	51	92
	Turner	Yosemite	West	1	22	67	165
	Yosemite	Elm	East	8	23	47	85
	Yosemite	Elm	West	0	18	59	146
	Elm	Lodi	Both	3	26	75	182
	Lodi	Vine	Both	4	29	83	198
	Vine	Kettleman	Both	8	36	98	231
	Kettleman	Harney	Both	8	36	98	231
Mills	Turner	Lockeford	East	0	13	34	68
	Turner	Lockeford	West	0	6	39	111
	Lockeford	Elm	East	0	3	18	42
	Lockeford	Elm	West	0	0	13	54
	Elm	Lodi	Both	0	10	29	59

TABLE III.D-2A: (Cont.)
PROJECTED CNEL CONTOUR DISTANCE FOR LODI, 1985

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Mills (cont.)	Lodi	Tokay	Both	0	2	17	40
	Tokay	Vine	Both	0	0	0	13
Stockton	Turner	Lockeford	Both	0	4	29	82
	Lockeford	Elm	East	0	3	27	79
	Lockeford	Elm	West	1	12	29	56
	Elm	Lodi	Both	0	11	29	59
	Lodi	Vine	East	7	22	47	87
	Lodi	Vine	West	0	18	62	157
	Vine	Kettleman	East	7	22	47	87
	Vine	Kettleman	West	0	18	62	157
Tokay	Lower Sac.	Mills	North	0	0	0	4
	Lower Sac.	Mills	South	0	0	0	0
	Mills	Ham	North	0	0	10	30
	Mills	Ham	South	0	0	2	31
	Ham	Hutchins	Both	0	0	9	27
	Hutchins	Church	Both	0	0	12	31
	Church	Cherokee	Both	0	0	3	18
Turner	Lower Sac.	Rutledge	Both	4	29	82	197
	Rutledge	Mills	Both	2	41	126	309
	Mills	Ham	Both	8	32	69	129
	Ham	Edgewood	Both	11	35	75	138
	Edgewood	Church	Both	13	39	81	147
	Church	Stockton	Both	0	11	62	170
	Stockton	Cherokee	Both	9	55	157	376
	Cherokee	Cluff	Both	0	3	42	125
Vine	Mills	Ham	North	0	0	11	31
	Mills	Ham	South	0	0	3	33
	Ham	Hutchins	Both	0	0	8	27
	Stockton	Cherokee	Both	0	0	3	12

**TABLE III.D-2B:
PROJECTED CNEL CONTOUR DISTANCES FOR LODI, 2005**

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Century	Ham	Church	Both	0	0	12	28
Cherokee	Harney	Kettleman	Both	16	78	213	503
	Kettleman	Vine	Both	16	78	213	503
	Vine	Lodi	Both	6	57	166	403
	Lodi	Lockford	Both	6	57	166	403
	Lockford	Turner	Both	15	68	181	425
Elm	Lower Sac.	Mills	Both	0	0	1	20
	Mills	Ham	Both	0	9	33	71
	Ham	Hutchins	Both	0	1	20	51
	Hutchins	Church	Both	0	0	9	30
	Church	Cherokee	Both	0	0	1	17
Ham	Turner	Lockeford	Both	0	1	20	51
	Lockeford	Lodi	Both	0	6	29	64
	Lodi	Kettleman	East	0	10	34	73
	Lodi	Kettleman	West	0	5	47	139
	Kettleman	Century	Both	0	5	47	139
	Century	Harney	Both	0	0	12	37
Harney	Lower Sac.	Ham	Both	10	36	92	213
	Ham	SPRR	North	11	26	49	86
	Ham	SPRR	South	2	20	60	145
	SPRR	SR 99	Both	10	36	92	213
Hutchins	Harney	Century	Both	7	32	71	132
	Century	Kettleman	Both	16	73	198	466
	Kettleman	Vine	Both	16	45	91	165
	Vine	Lodi	Both	8	27	57	106
	Lodi	Elm	Both	0	5	20	46
	Elm	Lockeford	Both	0	1	14	34
Kettleman	Lower Sac.	Mills	Both	64	161	370	823
	Mills	Ham	Both	45	140	346	791

TABLE III.D-2B: (Cont.)
PROJECTED CNEL CONTOUR DISTANCES FOR LODI, 2005

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Kettleman (cont.)	Ham	Hutchins	Both	45	142	349	798
	Hutchins	Church	Both	39	127	318	731
	Church	Cherokee	Both	26	100	260	605
	Cherokee	SR 99	Both	12	69	193	460
Lockeford	Mills	Ham	Both	0	4	23	55
	Ham	Hutchins	Both	0	4	23	55
	Hutchins	Church	North	0	25	79	195
	Hutchins	Church	South	8	26	54	99
	Church	Cherokee	North	3	28	81	195
	Church	Cherokee	South	12	29	57	101
	Cherokee	Cluff	Both	0	19	58	143
Lodi	Lower Sac.	Mills	Both	8	25	53	97
	Mills	Ham	Both	9	33	71	131
	Ham	Fairmont	Both	9	33	71	131
	Fairmont	Hutchins	Both	10	34	73	134
	Hutchins	Stockton	Both	10	34	73	134
	Stockton	Cherokee	Both	24	56	107	187
	Cherokee	Cluff	Both	13	66	179	424
Lower Sac.	Turner	Yosemite	East	19	40	73	127
	Turner	Yosemite	West	12	45	117	273
	Yosemite	Elm	East	10	26	52	92
	Yosemite	Elm	West	1	23	68	168
	Elm	Lodi	Both	9	40	106	248
	Lodi	Vine	Both	10	42	110	257
	Vine	Kettleman	Both	14	51	130	300
	Kettleman	Harney	Both	14	51	130	300
Mills	Turner	Lockeford	East	1	14	35	70
	Turner	Lockeford	West	0	7	42	116
	Lockeford	Elm	East	0	5	21	47
	Lockeford	Elm	West	0	0	18	64

TABLE III.D-2B: (Cont.)
PROJECTED CNEL CONTOUR DISTANCES FOR LODI, 2005

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Mills (cont.)	Elm	Lodi	Both	0	14	35	69
	Lodi	Tokey	Both	0	0	13	33
	Tokey	Vine	Both	0	0	4	19
Stockton	Turner	Lockeford	Both	0	11	46	120
	Lockeford	Elm	East	0	10	43	115
	Lockeford	Elm	West	4	18	39	72
	Elm	Lodi	Both	2	15	36	69
	Lodi	Vine	East	14	33	65	114
	Lodi	Vine	West	6	36	100	240
	Vine	Kettleman	East	14	33	65	114
	Vine	Kettleman	West	6	36	100	240
Tokey	Lower Sac.	Mills	North	0	0	1	14
	Lower Sac.	Mills	South	0	0	0	6
	Mills	Ham	North	0	0	11	31
	Mills	Ham	South	0	0	3	34
	Ham	Hutchins	Both	0	0	11	30
	Hutchins	Church	Both	0	2	15	36
	Church	Cherokee	Both	0	0	12	32
Turner	Lower Sac.	Rutledge	Both	11	44	114	266
	Rutledge	Mills	Both	11	62	171	406
	Mills	Ham	Both	16	44	89	159
	Ham	Edgewood	Both	17	45	91	163
	Edgewood	Church	Both	20	51	100	178
	Church	Stockton	Both	22	85	221	516
	Stockton	Cherokee	Both	20	80	210	490
	Cherokee	Cluff	Both	0	27	93	235
Vine	Mills	Ham	North	0	6	23	50
	Mills	Ham	South	0	0	21	71
	Ham	Hutchins	Both	0	6	22	48
	Stockton	Cherokee	Both	0	2	10	24

**TABLE III.D-3A:
PROJECTED CNEL CONTOUR DISTANCES FOR MANTECA, 1995**

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Airport	SR 120	Lathrop	Both	6	31	86	204
Center	Union	Walnut	North	0	7	21	43
	Union	Walnut	South	0	0	14	50
	Walnut	SPRR	Both	0	0	5	26
	SPRR	Main	North	0	0	9	30
	SPRR	Main	South	0	0	11	29
	Main	Fremont	Both	0	0	0	15
Cottage	Yosemite	North	East	0	0	0	13
	Yosemite	North	West	0	0	0	5
	North	SR 99	Both	0	0	5	19
	SR 99	Louise	Both	0	10	37	93
	Louise	Lathrop	Both	0	0	14	45
Edison	Main	Powers	Both	0	0	5	17
	Power	Alpine	Both	0	0	0	10
Lathrop	Airport	Union	Both	0	9	33	86
	Union	TWSRR	Both	0	0	23	74
	TWSRR	Main	Both	0	1	27	84
	Main	SR 99	Both	0	3	25	72
	SR 99	Cottage	Both	0	8	32	83
Louise	Airport	SPRR	North	24	48	85	145
	Airport	SPRR	South	19	59	146	334
	SPRR	Union	North	0	2	22	53
	SPRR	Union	South	0	0	24	89
	Union	TWSRR	Both	0	3	24	57
	TSWRR	Main	Both	0	5	27	61
	Main	SR 99	Both	0	15	42	85
	SR 99	Cottage	Both	0	6	27	72
Main	SR 120	Moffat	East	0	0	10	38
	SR 120	Moffat	West	0	0	8	61
	Moffat	Yosemite	East	0	0	5	23
	Moffat	Yosemite	West	0	0	0	29
	Yosemite	Center	Both	0	1	13	31

TABLE III.D-3A: (Cont.)
PROJECTED CNEL CONTOUR DISTANCES FOR MANTECA, 1985

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Main (cont.)	Center	North	Both	0	0	15	39
	North	Alameda	Both	0	0	13	36
	Alameda	Edison	Both	0	1	40	123
	Edison	Louise	Both	0	0	44	143
	Louise	SR 99	Both	0	8	67	193
	SR 99	Lathrop	Both	0	1	16	48
Moffat	Main	Powers	Both	0	0	9	38
	Powers	SR 99	Both	0	0	19	59
North	Main	Fremont	Both	0	0	8	24
	Fremont	Powers	Both	0	0	9	27
	Powers	Cottage	Both	0	0	6	22
Powers	Moffat	Yosemite	Both	0	0	0	9
	Yosemite	North	Both	0	0	12	33
	North	Edison	Both	0	0	9	27
SR 99	SR 120	Lathrop	Both	77	209	495	1113
SR 120	Airport	SR 99	Both	46	124	292	655
Union	SR 120	Yosemite	Both	0	0	3	24
	Yosemite	Center	Both	0	0	2	37
	Center	Louise	Both	0	0	17	74
	Louise	Lathrop	Both	0	2	22	53
Yosemite	Airport	Union	Both	0	0	36	123
	Union	Locust	Both	0	0	16	82
	Locust	SPRR	Both	0	0	14	36
	SPRR	Main	Both	16	24	37	56
	Main	Fremont	Both	0	0	10	54
	Fremont	Powers	North	0	0	15	40
	Fremont	Powers	South	0	0	11	56
	Powers	Cottage	North	5	20	43	80
	Powers	Cottage	South	0	14	53	138
	Cottage	SR 99	Both	0	16	59	150

**TABLE III.D-3B:
PROJECTED CNEL CONTOUR DISTANCES FOR MANTECA, 2005**

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Airport	SR 120	Lathrop	Both	19	59	146	334
Center	Union	Walnut	North	3	15	33	62
	Union	Walnut	South	0	6	32	88
	Walnut	SPRR	Both	0	0	16	44
	SPRR	Main	North	0	3	21	49
	SPRR	Main	South	0	5	21	44
	Main	Fremont	Both	0	0	8	28
Cottage	Yosemite	North	East	0	0	7	24
	Yosemite	North	West	0	0	0	22
	North	SR 99	Both	0	1	13	32
	SR 99	Louise	Both	5	24	65	155
	Louise	Lathrop	Both	0	7	30	78
Edison	Main	Powers	Both	0	1	12	28
	Powers	Alpine	Both	0	0	4	20
Lathrop	Airport	Union	Both	3	21	60	143
	Union	TWSRR	Both	0	11	49	130
	TWSRR	Main	Both	0	14	56	145
	Main	SR 99	Both	0	14	49	124
	SR 99	Cottage	Both	3	20	58	138
Louise	Airport	SPRR	North	37	68	118	196
	Airport	SPRR	South	39	103	241	540
	SPRR	Union	North	0	13	39	80
	SPRR	Union	South	0	9	57	161
	Union	TWSRR	Both	0	15	42	85
	TSWRR	Main	Both	0	17	46	91
	Main	SR 99	Both	7	30	66	123
	SR 99	Cottage	Both	1	17	50	121
Main	SR 120	Moffat	East	0	2	25	62
	SR 120	Moffat	West	0	0	35	119
	Moffat	Yosemite	East	0	0	15	37
	Moffat	Yosemite	West	0	0	13	66
	Yosemite	Center	Both	0	8	23	45

TABLE III.D-3B: (Cont.)
PROJECTED CNEL CONTOUR DISTANCES FOR MANTECA, 2005

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Main (cont.)	Center	North	Both	0	9	28	60
	North	Alameda	Both	0	7	25	55
	Alameda	Edison	Both	0	21	82	214
	Edison	Louise	Both	0	21	94	252
	Louise	SR 99	Both	0	38	131	332
	SR 99	Lathrop	Both	0	8	32	84
Moffat	Main	Powers	Both	0	2	23	69
	Powers	SR 99	Both	0	10	39	103
North	Main	Fremont	Both	0	3	17	38
	Fremont	Powers	Both	0	4	19	42
	Powers	Cottage	Both	0	2	15	35
Powers	Moffat	Yosemite	Both	0	0	4	20
	Yosemite	North	Both	0	7	23	50
	North	Edison	Both	0	4	19	42
SR 99	SR 120	Lathrop	Both	144	355	809	1791
SR 120	Airport	SR 99	Both	86	209	477	1054
Union	SR 120	Yosemite	Both	0	0	14	41
	Yosemite	Center	Both	0	0	20	76
	Center	Louise	Both	0	4	46	137
	Louise	Lathrop	Both	0	13	39	80
Yosemite	Airport	Union	Both	0	16	80	220
	Union	Locust	Both	0	1	50	153
	Locust	SPRR	Both	0	7	26	56
	SPRR	Main	Both	21	31	47	71
	Main	Fremont	Both	0	0	32	102
	Fremont	Powers	North	0	8	29	62
	Fremont	Powers	South	0	1	34	106
	Powers	Cottage	North	13	32	63	112
	Powers	Cottage	South	5	34	97	232
	Cottage	SR 99	Both	7	38	105	250

**TABLE III.D-4A:
PROJECTED CNEL CONTOUR DISTANCES FOR SAN JOAQUIN COUNTY, 1985**

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Airport	S. J. River	SR 120	Both	0	6	26	70
	Lathrop	Lovelace	Both	0	2	22	66
Byron	Alameda Co.	Eleventh	Both	4	27	76	183
Chrisman	I-580	Eleventh	Both	3	25	74	177
Clements	Comstock	SR 12	Both	0	2	18	53
Copperopolis	Jack Tone	Escalon	Both	0	0	10	37
Corral Hollow	I-580	Valpico	Both	0	8	32	82
	Larch	Lammers	Both	0	8	32	82
Eleventh	I-205	Corral Hollow	Both	8	54	154	371
	Corral Hollow	I-5	Both	8	54	154	371
Elliott	Peltier	Lockeford	Both	3	26	74	179
Escalon	SR 120	SR 26	Both	2	21	61	148
French Camp	Prescott	SR 120	Both	0	12	44	114
Grant Line	Byron	Berry	Both	9	34	87	202
Harney	SR 88	Tully	Both	2	18	53	127
Howard	Tracy	Middle River	Both	0	3	26	75
I-5	Stanislaus Co.	I-205	Both	23	107	290	684
	I-205	De Lima	Both	77	235	576	1311
	Eight Mile	SR 12	Both	47	160	405	935
	SR 12	Sacramento Co.	Both	47	154	384	882
I-205	Alameda Co.	Corral Hollow	Both	68	191	457	1032
	MacArthur	I-5	Both	65	186	447	1011
I-580	Alameda Co.	Stanislaus Co.	Both	26	98	255	593
Jack Tone	W. Ripon	French Camp	Both	0	13	41	103
	Eight Mile	Tully	Both	0	11	42	110
Jahant	Tully	SR 88	Both	0	0	12	42
Lathrop	I-5	Airport	Both	1	25	77	189
Liberty	SR 99	Amador Co.	Both	0	6	26	70
Linne	Corral Hollow	Bird	Both	5	25	67	159
Lone Tree	Escalon	Stanislaus Co.	Both	0	2	18	52

TABLE III.D-4A: (Cont.)
PROJECTED CNEL CONTOUR DISTANCES FOR SAN JOAQUIN COUNTY, 1985

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Louise	I-5	Airport	Both	22	66	161	366
Lower Sac.	Eight Mile	Harney	Both	1	21	65	158
	Turner	Sacramento Co.	Both	0	15	51	128
MacArthur	Schulte	Linne	Both	0	14	45	111
McHenry	Jones	Stanislaus Co.	Both	13	48	122	281
Mariposa	Jack Tone	Escalon	Both	7	33	91	215
Milgeo	SR 99	Murphy	Both	0	0	9	34
New Hope	Thornton	Sacramento Co.	Both	0	5	26	69
Peltier	I-5	Elliott	Both	0	14	42	105
	Elliott	Tully	Both	0	10	35	89
River	Santa Fe	N. Ripon	Both	0	11	39	102
Santa Fe	SR 120	Stanislaus Co.	Both	0	18	58	143
Schulte	MacArthur	Chrisman	Both	0	0	9	33
SR 4	Contra Costa Co.	Woodsbro	Both	16	48	119	271
	Jack Tone	Stanislaus Co.	Both	0	6	32	88
SR 12	Sacramento Co.	Guard	Both	22	69	169	385
	Guard	I-5	Both	15	61	161	378
	I-5	Lower Sac.	Both	22	70	174	399
	SR 99	SR 88	Both	7	38	106	252
	SR 88	Amador Co.	Both	6	36	101	242
SR 26	Jack Tone	Fine	Both	0	19	67	171
	Fine	Calaveras Co.	Both	9	32	81	186
SR 33	Stanislaus Co.	I-5	Both	0	8	48	133
SR 88	Eight Mile	Amador Co.	Both	16	53	133	304
SR 99	Stanislaus Co.	SR 120	Both	70	194	462	1042
	Eight Mile	Harney	Both	64	188	458	1040
	Harney	Sacramento Co.	Both	64	184	445	1007
SR 120	I-5	Airport	Both	31	99	244	557
	SR 99	Stanislaus Co.	Both	12	47	123	289
SR 132	Chrisman	Stanislaus Co.	Both	18	78	210	494

TABLE III.D-4A: (Cont.)
PROJECTED CNEL CONTOUR DISTANCES FOR SAN JOAQUIN COUNTY, 1985

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Thornton	Eight Mile	Sacramento Co.	Both	0	2	18	54
Tracy	Linne	SR 4	Both	0	14	44	109
Turner	I-5	Lower Sac.	Both	1	17	51	123
Valpico	Corral Hollow	Tracy	Both	0	0	0	10
Wall	SR 26	Comstock	Both	0	0	6	26
Walnut Grove	Sacramento Co.	I-5	Both	7	29	76	177
West	Eight Mile	Harney	Both	0	32	107	268
West Ripon	Airport	SR 99	Both	2	18	52	127
Woodbridge	Lower Sac.	SR 99	Both	0	0	12	40
Yosemite	SR 120	Airport	Both	0	36	115	286

**TABLE III.D-4B:
PROJECTED CNEL CONTOUR DISTANCES FOR SAN JOAQUIN COUNTY, 2005**

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Airport	S. J. River	SR 120	Both	9	34	88	203
	Lathrop	Lovelace	Both	5	30	84	199
Bird	Linne	Eleventh	Both	0	0	89	192
Byron*	Alameda Co.	Grant Line	Both	0	76	164	354
	Grant Line	I-205	Both	47	104	225	484
	I-205	Eleventh	Both	0	47	104	223
Chrisman	Linne	Valpico	Both	0	0	0	66
	Valpico Road	Eleventh	Both	0	0	54	116
Clements	Cornstock	SR 12	Both	0	11	39	98
Copperopolis	Jack Tone	Escalon	Both	0	5	27	72
Corral Hollow	Alameda Co.	I-580	Both	0	0	0	62
	I-580	Linne	Both	0	51	109	235
	Linne	Valpico	Both	0	89	192	414
	Valpico	Schulte	Both	0	155	333	718
	Schulte	Eleventh	Both	109	236	508	1095
	Eleventh	Lowell	Both	106	228	492	1059
Eleventh	I-205	SPRR	Both	0	77	167	360
	MacArthur	Lovely	Both	0	57	123	265
	Lovely	I-5	Both	0	52	112	242
Elliott	Petier	Lockeford	Both	17	54	136	313
Escalon	SR 120	SR 26	Both	13	45	113	261
French Camp	Prescott	SR 120	Both	6	31	86	205
Grant Line	Patterson Pass	Hansen	Both	0	0	0	76
	Hansen	Byron	Both	0	60	130	279
	Byron	Corral Hollow	Both	0	0	56	121
	MacArthur	*F*	Both	0	0	0	84
	F	Eleventh	Both	0	0	0	92
	Eleventh	I-5	Both	0	0	0	76

* Does not include Mountain House. See Table III.D-4C.

TABLE III.D-4B: (Cont.)
PROJECTED CNEL CONTOUR DISTANCES FOR SAN JOAQUIN COUNTY, 2005

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Harney	SR 88	Tully	Both	11	39	97	224
Howard	Tracy	Middle River	Both	0	17	55	138
I-5	I-580	SR 132	Both	0	156	336	723
	SR 132	Linne	Both	0	167	360	776
	Linne	Eleventh	Both	90	194	418	901
	Eleventh	I-205	Both	147	316	681	1467
	I-205	S. J. River	Both	321	691	1488	3207
I-205*	Alameda Co.	Patterson Pass	Both	238	513	1106	2383
	Patterson Pass	Eleventh	Both	251	540	1164	2508
	Eleventh	Grant Line	Both	197	425	915	1971
	Grant Line	Tracy	Both	209	451	972	2093
	MacArthur	I-5	Both	243	523	1126	2425
I-580	Alameda Co.	Patterson Pass	Both	104	223	481	1037
	Patterson Pass	Corral Hollow	Both	100	215	463	998
	Corral Hollow	SR 132	Both	102	219	472	1017
	SR 132	I-5	Both	70	151	325	701
Jack Tone	W. Ripon	French Camp	Both	7	30	78	183
	Eight Mile	Tully	Both	5	30	83	197
Jahant	Tully	SR 88	Both	0	6	30	81
Lammers	Valpico	Schulte	Both	0	99	212	457
Lathrop	SR 99	Amador Co.	Both	2	18	53	128
Liberty	SR 99	Amador Co.	Both	2	18	53	128
Linne	Corral Hollow	Tracy	Both	0	0	0	76
	Tracy	MacArthur	Both	0	0	0	82
	MacArthur	Chrisman	Both	0	0	0	67
	Chrisman	Bird	Both	0	0	0	88
Lone Tree	Escalon	Stanislaus Co.	Both	0	11	38	96
Louise	I-5	Airport	Both	48	123	263	631

* Does not include Mountain House. See Table III.D-4C.

TABLE III.D-4B: (Cont.)
PROJECTED CNEL CONTOUR DISTANCES FOR SAN JOAQUIN COUNTY, 2005

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Lower Sac.	Eight Mile	Harney	Both	13	47	121	279
	Turner	Sacramento Co.	Both	8	36	97	228
MacArthur	Schulte	Linne	Both	9	33	85	197
McHenry	Jones	Stanislaus Co.	Both	34	91	216	485
Mariposa	Jack Tone	Escalon	Both	23	67	164	373
Milgeo	SR 99	Murphy	Both	0	5	24	66
New Hope	Thornton	Sacramento Co.	Both	2	18	52	127
Patterson Pass*	I-580	I-205	Both	0	92	199	429
	I-205	Grant Line	Both	0	0	71	154
	Grant Line	Byron	Both	0	0	54	117
Peltier	I-5	Elliott	Both	8	31	80	185
	Elliott	Tully	Both	4	23	63	149
River	Santa Fe	N. Ripon	Both	5	28	77	182
Santa Fe	SR 120	Stanislaus Co.	Both	11	42	109	254
Schulte	Patterson Pass	Hansen	Both	0	0	69	148
	Hansen	Lammers	Both	0	0	94	202
	Lammers	Corral Hollow	Both	0	0	48	105
	Corral Hollow	Tracy	Both	0	43	98	210
	MacArthur	Chrisman	Both	0	0	0	58
SR 4	Contra Costa Co.	Woodsbro	Both	35	91	211	471
	Jack Tone	Stanislaus Co.	Both	0	16	55	137
SR 12	Sacramento Co.	Guard	Both	34	93	221	498
	Guard	I-5	Both	29	92	228	521
	I-5	Lower Sac.	Both	70	174	398	884
	SR 99	SR 88	Both	35	99	236	534
	SR 88	Amador County	Both	22	71	177	405
SR 26	Jack Tone	Fine	Both	4	36	105	253
	Fine	Calaveras Co.	Both	13	39	96	218

* Does not include Mountain House. See Table III.D-4C.

TABLE III.D-4B: (Cont.)
PROJECTED CNEL CONTOUR DISTANCES FOR SAN JOAQUIN COUNTY, 2005

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
SR 33	Stanislaus Co.	I-5	Both	0	31	97	239
SR 88	Eight Mile	Amador County	Both	33	90	212	476
SR 99	Stanislaus Co.	SR 120	Both	109	279	646	1438
SR 99 (cont.)	Eight Mile	Harney	Both	132	337	779	1734
	Harney	Sacramento Co.	Both	119	304	704	1566
SR 120	I-5	Airport	Both	69	180	420	937
	SR 99	Stanislaus Co.	Both	19	63	159	366
SR 132	Chrisman	Stanislaus Co.	Both	45	139	340	775
Thornton	Eight Mile	Sacramento Co.	Both	0	12	39	99
Tracy	Linne	SR 4	Both	8	32	83	192
Turner	I-5	Lower Sac.	Both	11	37	94	217
Valpico	Lammers	Corral Hollow	Both	0	0	56	212
	Corral Hollow	Tracy	Both	0	0	68	146
	Tracy	MacArthur	Both	0	0	0	76
	MacArthur	Chrisman	Both	0	0	56	121
Wall	SR 26	Comstock	Both	0	2	18	53
Walnut Grove	Sacramento Co.	I-5	Both	20	57	136	309
West	Eight Mile	Harney	Both	18	77	203	475
W. Ripon	Airport	SR 99	Both	11	39	97	224
Woodbridge	Lower Sac.	SR 99	Both	0	7	29	76
Yosemite	SR 120	Airport	Both	21	83	216	504

TABLE III.D-4C
FUTURE TRAFFIC NOISE LEVELS WITH BUILDOUT OF MOUNTAIN HOUSE

Segment No.	Roadway	ADT	Distance to L _{dn} Countour (feet)	
			60 dB	65 dB
I-205				
1	Entire Length	100,519	2124	986
Patterson Pass Road				
2	I-205 to Grant Line Road	50,695	531	247
3	Grant Line Road to Mascot Boulevard	25,483	336	156
4	Mascot Boulevard to Byron Road	23,204	316	146
Grant Line Road				
5	Hansen Road to Patterson Pass Road	22,635	317	147
6	Patterson Pass Road to Mountain House Road	19,822	250	116
Byron Road				
7	Hansen Road to Patterson Pass Road	33,884	464	216
8	Patterson Pass Road to Mountain House Road	17,389	298	138
DeAnza Boulevard				
9	Entire Length	13,871	119	55
Marina Boulevard				
10	Byron Road to DeAnza Boulevard	11,813	107	50
11	DeAnza Boulevard to Mascot Boulevard	11,819	107	50
12	Mascot Boulevard to Grant Line Road	13,814	119	55
Central Parkway				
13	Byron Road to DeAnza Boulevard	20,871	157	73
14	DeAnza Boulevard to Main Street	13,000	114	53
15	Main Street to Mascot Boulevard	13,000	114	53
Main Street				
16	Marina Boulevard to Central Parkway	3,400	33	15
17	Central Parkway to Patterson Pass Road	7,400	55	26
Mountain House Boulevard				
18	Entire Length	16,700	95	44
Mascot Boulevard				
19	Marina Boulevard to Central Parkway	10,400	99	46
20	Central Parkway to Patterson Pass Road	5,000	60	28

Notes:

1. Source of ADT is EIR, ER-93-2
2. Traffic noise levels assume 6 lanes on I-205.
3. Distance to traffic noise levels are measured from roadway centerline.
4. Analysis conducted September 14, 1994

**TABLE III.D-5A:
PROJECTED CNEL CONTOUR DISTANCES FOR STOCKTON, 1985**

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Acacia	Pershing	El Dorado	Both	0	0	2	20
	El Dorado	California	Both	0	0	0	4
Airport	Lovelace	Sperry	Both	0	23	78	197
	Sperry	Industrial	Both	0	23	78	197
	Industrial	Carpenter	Both	0	0	48	168
	Carpenter	Eighth	East	0	7	79	235
	Carpenter	Eighth	West	0	2	36	89
	Eighth	Charter	Both	0	21	108	298
	Charter	Hazelton	Both	0	3	28	68
	Hazelton	Miner	Both	0	0	14	46
	Miner	Oak	Both	0	0	24	62
	Oak	Harding	Both	0	2	27	66
Alpine	Rainier	Wallace	Both	0	0	11	33
	Wallace	Pershing	Both	0	0	11	41
	Kensington	Pacific	Both	0	0	2	27
	Pacific	El Dorado	Both	0	5	31	72
	El Dorado	California	North	0	10	76	219
	El Dorado	California	South	0	7	39	89
	California	West	Both	0	12	72	202
	West	Sanguinetti	Both	0	25	88	225
	Sanguinetti	Wilson	Both	4	23	64	153
Arch-Airport	Airport	SR 99	Both	3	21	58	140
	SR 99	Newcastle	Both	1	17	51	123
Ben Holt	Herndon	I-5	North	0	4	56	170
	Herndon	I-5	South	0	5	33	77
	I-5	Alexandria	North	0	0	45	144
	I-5	Alexandria	South	0	3	29	69
	Alexandria	Pershing	Both	0	1	26	64
	Pershing	Pacific	Both	0	0	23	60
	Pacific	Eldorado	North	0	0	15	47

TABLE III.D-5A: (Cont.)
PROJECTED CNEL CONTOUR DISTANCES FOR STOCKTON, 1985

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Ben Holt (cont.)	Pacific	El Dorado	South	0	0	18	85
Bianchi	Pacific	El Dorado	North	0	0	3	29
	Pacific	El Dorado	South	0	0	0	48
	El Dorado	West Lane	Both	0	0	18	53
	West Lane	Ijams	Both	0	0	0	25
Brookside	Buckley Cove	W. City Limit	Both	0	0	7	27
	W. City Limit	I-5	Both	0	0	0	24
	I-5	McGaw	North	0	0	2	20
	I-5	McGaw	South	0	0	0	18
	McGaw	Pershing	Both	0	0	0	25
	Pershing	Pacific	North	0	4	20	45
	Pershing	Pacific	South	0	0	16	61
California	El Dorado	Eighth	Both	0	0	0	36
	Eighth	Charter	Both	0	0	2	26
	Charter	Main	Both	0	0	2	27
	Main	Park	Both	0	0	13	38
	Park	Harding	Both	0	0	23	97
	Harding	Alpine	East	0	0	20	57
	Harding	Alpine	West	0	0	31	115
Center	Cleveland	Harding	Both	12	42	90	167
	Harding	Fremont	East	0	13	44	93
	Harding	Fremont	West	0	15	78	215
	Fremont	Weber	Both	0	14	89	250
	Weber	Lafayette	Both	0	20	89	239
	Lafayette	Charter	Both	0	0	41	135
	Charter	Fourth	East	0	0	16	50
	Charter	Fourth	West	0	0	21	92
	Fourth	Fifth	East	0	0	16	50
	Fourth	Fifth	West	0	0	21	92
Cherokee	Sanguinetti	SR 99	Both	0	0	18	52

TABLE III.D-5A: (Cont.)
PROJECTED CNEL CONTOUR DISTANCES FOR STOCKTON, 1985

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Cherokee (cont.)	SR 99	Alpine	Both	3	15	33	61
Charter	S.J. River	I-5	Both	0	0	47	159
	I-5	El Dorado	North	0	17	57	119
	I-5	El Dorado	South	0	32	127	332
	El Dorado	Wilson	Both	3	34	83	161
	Wilson	Mariposa	Both	0	12	119	351
	Mariposa	SR 99	Both	0	0	54	209
Country Club	Wisconsin	I-5	Both	0	1	22	55
	I-5	Pershing	Both	0	0	19	50
Davis	Thornton	N. City Limit	Both	0	0	21	56
	N. City Limit	Eight Mile	Both	10	23	44	77
Eighth	S. J. River	I-5	Both	0	0	1	25
	I-5	El Dorado	Both	0	0	0	23
	Airport	Mariposa	Both	0	0	0	20
Eight Mile	I-5	Jack Tone	Both	7	33	89	212
El Dorado	Howard	French Camp	Both	0	3	43	131
	French Camp	California	Both	0	0	40	144
	California	Eighth	Both	0	0	30	124
	Eighth	Fourth	Both	0	0	26	70
	Fourth	Lafayette	East	0	0	43	139
	Fourth	Lafayette	West	0	3	28	68
	Lafayette	Weber	Both	0	0	54	175
	Weber	Park	Both	0	2	62	192
	Park	Harding	Both	0	10	34	69
	Harding	Cleveland	Both	0	0	20	55
	Cleveland	Alpine	Both	0	0	26	69
	Alpine	Bianchi	Both	0	7	35	78
	Bianchi	March	East	0	13	45	96
	Bianchi	March	West	0	16	84	230
	March	Yokuts	Both	0	0	62	221

TABLE III.D-5A: (Cont.)
PROJECTED CNEL CONTOUR DISTANCES FOR STOCKTON, 1985

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
El Dorado (cont.)	Yokuts	Robinhood	Both	0	0	0	42
	Robinhood	Swain	Both	0	14	45	95
	Swain	Ben Holt	East	0	8	66	191
	Swain	Ben Holt	West	0	8	37	84
	Ben Holt	Hammer	Both	0	0	7	50
	Hammer	Ponce DeLeon	Both	0	0	9	42
	Ponce DeLeon	Morada	Both	0	0	0	17
Filbert	Waterloo	Fremont	Both	0	1	22	55
	Fremont	Main	Both	0	4	24	55
Fremont	Pershing	California	North	0	8	26	53
	Pershing	California	South	0	0	34	107
French Camp	I-5	Prescott	Both	12	46	117	271
Hammer	I-5	Pershing	Both	0	0	25	78
	Pershing	Lower Sac.	North	0	7	35	79
	Pershing	Lower Sac.	South	0	5	58	172
	Lower Sac.	El Dorado	North	0	21	57	114
	Lower Sac.	El Dorado	South	0	29	110	284
	El Dorado	Tam O'Shanter	North	4	28	62	113
	El Dorado	Tam O'Shanter	South	4	34	80	154
	Tam O'Shanter	West	Both	0	26	122	331
	West	E. City Limit	North	0	23	57	107
	West	E. City Limit	South	0	56	178	443
	E. City Limit	SR 99	Both	35	93	220	493
Harding	Pershing	Pacific	Both	0	7	32	71
	Pacific	El Dorado	Both	0	34	119	303
	El Dorado	California	Both	0	20	89	238
	California	West	Both	0	24	105	279
	West	Wilson	North	0	18	91	248
	West	Wilson	South	0	11	37	76
	Wilson	Waterloo	Both	0	2	29	72

TABLE III.D-5A: (Cont.)
PROJECTED CNEL CONTOUR DISTANCES FOR STOCKTON, 1985

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Hazelton	San Joaquin	California	North	0	0	0	6
	San Joaquin	California	South	0	0	0	16
	California	"B"	North	0	0	3	29
	California	"B"	South	0	0	0	48
Howard	Middle River	Endow	Both	0	12	45	115
	Endow	I-5	Both	8	36	95	225
Ijams	Bianchi	McAllen	Both	0	0	11	47
I-5	Downing	De Lima	Both	68	214	531	1215
	Downing	Charter	Both	36	145	382	893
	Charter	Washington	Both	40	153	399	930
	Washington	Pershing	Both	49	174	443	1025
	Pershing	Country Club	Both	21	68	142	261
	Country Club	March	Both	22	69	144	263
	March	Benjamin Holt	East	25	122	332	786
	March	Benjamin Holt	West	10	50	113	214
	Benjamin Holt	Hammer	Both	3	40	97	189
	Hammer	Bear Creek	East	0	48	171	437
	Hammer	Bear Creek	West	0	20	66	139
	Bear Creek	Eight Mile	Both	40	145	373	865
Jack Tone	Eight Mile	French Camp	Both	0	8	35	94
Lower Sac.	Pacific	MacDuff	Both	0	18	98	269
	MacDuff	Bear Creek	East	0	0	22	68
	MacDuff	Bear Creek	West	0	0	48	168
	Bear Creek	Eight Mile	Both	7	34	91	216
Main	Union	Wilson	Both	0	0	5	26
	Wilson	Locust	Both	0	0	14	76
	Locust	Filbert	Both	0	0	22	58
	Filbert	SR 99	Both	0	4	30	72
	SR 99	Alpine	Both	0	22	68	167
	Alpine	Jack Tone	Both	0	7	34	93

TABLE III.D-5A: (Cont.)
PROJECTED CNEL CONTOUR DISTANCES FOR STOCKTON, 1985

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
March	Feather River	I-5	Both	0	0	0	52
	I-5	Quail Lakes	Both	0	49	170	431
	Quail Lakes	Grouse Run	Both	0	41	152	393
	Grouse Run	Pershing	Both	0	37	143	373
	Pershing	Pacific	Both	0	22	112	305
	Pacific	El Dorado	Both	0	0	52	170
	El Dorado	West	Both	0	14	93	266
Mariposa	Farmington	SR 99	Both	0	26	115	305
	SR 99	Jack Tone	Both	16	53	133	307
Mathews	Howard	I-5	Both	8	36	95	225
McAllen	City Limit	Wilson	Both	5	23	63	149
Mendocino	Pershing	Kensington	North	0	0	0	33
	Pershing	Kensington	South	0	0	0	18
Miner	Union	Airport	Both	0	0	61	196
	Airport	Wilson	North	0	0	52	176
	Airport	Wilson	South	0	0	24	70
	Wilson	Filbert	North	0	0	24	62
	Wilson	Filbert	South	0	2	22	51
	Filbert	SR 99	Both	0	0	10	34
Monte Diablo	Louise Park	I-5	North	0	0	5	25
	Louise Park	I-5	South	0	0	0	29
	I-5	Argonne	Both	0	0	18	46
Morada	West	S. Pacific	Both	0	0	20	84
	S. Pacific	SR 99	Both	0	9	33	85
Oak	Pershing	Center	Both	0	0	11	35
	Center	California	Both	0	4	19	43
	California	Airport	Both	0	2	17	39
Pacific	Harding	Castle	Both	0	0	16	44
	Castle	Alpine	Both	0	4	26	59
	Alpine	Rosemarie	East	0	17	107	300

TABLE III.D-5A: (Cont.)
PROJECTED CNEL CONTOUR DISTANCES FOR STOCKTON, 1985

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Pacific (cont.)	Alpine	Rosemarie	West	0	5	43	103
	Rosemarie	March	East	0	0	8	47
	Rosemarie	March	West	0	0	17	71
	March	Yokuts	Both	0	34	131	341
	Yokuts	Robinhood	Both	0	28	122	325
	Robinhood	Swain	Both	0	11	110	324
	Swain	Benjamin Holt	Both	0	32	141	377
	Benjamin Holt	Hammer	Both	0	11	111	327
Park	Pershing	Center	Both	0	1	19	47
	Center	California	North	0	7	25	51
	Center	California	South	0	0	30	100
	California	Airport	North	0	0	24	86
	California	Airport	South	0	5	22	46
Pershing	I-5	Acacia	East	0	0	23	60
	I-5	Acacia	West	0	0	34	119
	Acacia	Harding	East	0	7	62	181
	Acacia	Harding	West	0	8	37	82
	Harding	Alpine	Both	0	14	43	98
	Alpine	Brookside	East	0	11	42	91
	Alpine	Brookside	West	0	13	76	214
	Brookside	Robinhood	East	0	9	33	68
	Brookside	Robinhood	West	0	10	70	200
	Robinhood	Benjamin Holt	Both	0	11	43	92
	Benjamin Holt	Lincoln	Both	0	6	33	76
	Lincoln	Hammer	Both	0	6	28	60
	Hammer	Thornton	Both	0	0	22	59
Roberts	Howard	SR 4	Both	0	7	29	76
Robinhood	March	Grouse Run	Both	0	0	12	51
	Grouse Run	Pershing	Both	0	0	21	56
	Pershing	Pacific	Both	0	0	15	42

TABLE III.D-5A: (Cont.)
PROJECTED CNEL CONTOUR DISTANCES FOR STOCKTON, 1985

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Rosemarie	Romano	Pershing	Both	0	0	13	62
	Pershing	Pacific	Both	0	0	31	102
Roth	I-5	Airport	Both	7	29	77	181
Sanguinetti	Cherokee	Alpine	Both	1	20	61	151
SR 4	Woodsbro	Fresno	Both	10	37	97	225
	Charter	Jack Tone	Both	2	21	61	149
SR 26	SR 99	Jack Tone	Both	14	49	123	285
SR 88	SR 99	Eight Mile	Both	15	57	148	344
SR 99	Lathrop	Wilson	Both	76	205	481	1079
	Wilson	Eight Mile	Both	62	186	454	1032
Swain	I-5	Alexandria	Both	0	0	11	35
	Alexandria	Pacific	Both	0	5	26	59
Thornton	Pacific	El Dorado	Both	0	0	13	44
	Pacific	Hammer	Both	0	28	106	275
	Hammer	Pershing	Both	0	20	55	111
	Pershing	Davis	Both	4	29	70	135
	Davis	Wagner	Both	0	31	114	292
	Wagner	N. City Limit	East	0	14	46	97
	Wagner	N. City Limit	West	0	17	84	228
	N. City Limit	Eight Mile	Both	0	10	35	91
Waterloo	Wilson	Harding	Both	0	11	79	225
	Harding	SR 99	Both	0	11	79	225
Weber	Wilson	California	Both	0	0	0	18
	California	Center	Both	0	0	0	21
	Center	I-5	Both	0	0	38	146
West	Harding	Alpine	Both	0	41	136	340
	Alpine	Bianchi	Both	11	85	244	589
	Bianchi	March	Both	0	58	190	474
	March	Swain	Both	0	56	185	463
	Swain	Hammer	Both	0	32	147	396

**TABLE III.D-5A: (Cont.)
PROJECTED CNEL CONTOUR DISTANCES FOR STOCKTON, 1985**

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
West (cont.)	Hammer	Mosher	Both	0	49	170	431
	Mosher	Morada	East	0	0	67	238
	Mosher	Morada	West	0	0	6	46
	Morada	Eight Mile	Both	0	36	115	285
Wilson	Charter	Market	Both	0	9	38	84
	Market	Miner	Both	0	6	27	58
	Miner	Fremont	Both	0	8	63	183
	Fremont	Harding	North	0	7	34	78
	Fremont	Harding	South	0	5	57	169
	Harding	SR 99	Both	0	11	82	235

**TABLE III.D-5B:
PROJECTED CNEL CONTOUR DISTANCES FOR STOCKTON, 2005**

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Acacia	Pershing	El Dorado	Both	0	0	4	23
	El Dorado	California	Both	0	0	0	13
Airport	Lovelace	Sperry	Both	13	56	149	349
	Sperry	Industrial	Both	13	56	149	349
	Industrial	Carpenter	Both	0	52	176	443
	Carpenter	Eighth	East	0	52	177	445
	Carpenter	Eighth	West	0	24	70	144
	Eighth	Charter	Both	0	61	196	487
	Charter	Hazleton	Both	0	12	43	91
	Hazleton	Miner	Both	0	3	29	69
	Miner	Oak	Both	0	13	44	93
	Oak	Harding	Both	0	17	51	104
Alpine	Rainier	Wallace	Both	0	6	24	53
	Wallace	Pershing	Both	0	0	10	39
	Kensington	Pacific	Both	0	0	2	27
	Pacific	El Dorado	Both	0	5	31	72
	El Dorado	California	North	0	10	76	219
	El Dorado	California	South	0	7	39	89
	California	West	Both	0	14	76	211
	West	Sanguinetti	Both	3	41	124	302
	Sanguinetti	Wilson	Both	16	47	116	265
Arch-Airport	Airport	SR 99	Both	14	43	107	246
	SR 99	Newcastle	Both	9	34	88	203
Benjamin Holt	Herndon	I-5	North	0	12	74	208
	Herndon	I-5	South	0	10	41	89
	I-5	Alexandria	North	0	8	64	185
	I-5	Alexandria	South	0	9	38	83
	Alexandria	Pershing	Both	0	3	28	68
	Pershing	Pacific	Both	0	3	28	69
	Pacific	El Dorado	North	0	0	21	56

TABLE III.D-5B: (Cont.)
PROJECTED CHEL CONTOUR DISTANCES FOR STOCKTON, 2005

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Ben Holt (cont.)	Pacific	El Dorado	South	0	0	29	109
Bianchi	Pacific	El Dorado	North	0	0	18	53
	Pacific	El Dorado	South	0	0	26	104
	El Dorado	West	Both	0	14	47	99
	West	Ijams	Both	0	0	9	69
Brookside	Buckley Cove	W. City Limit	Both	0	3	19	52
	W. City Limit	I-5	Both	0	0	13	50
	I-5	McGaw	North	0	0	12	35
	I-5	McGaw	South	0	0	6	46
	McGaw	Pershing	Both	0	0	0	33
	Pershing	Pacific	North	0	5	21	47
	Pershing	Pacific	South	0	0	18	64
California	El Dorado	Eighth	Both	0	0	16	80
	Eighth	Charter	Both	0	0	15	47
	Charter	Main	Both	0	0	15	47
	Main	Park	Both	0	0	15	40
	Park	Harding	Both	0	0	23	97
	Harding	Alpine	East	0	1	27	67
	Harding	Alpine	West	0	0	43	143
Center	Cleveland	Harding	Both	39	86	160	277
	Harding	Fremont	East	10	39	85	159
	Harding	Fremont	West	10	67	191	459
	Fremont	Weber	Both	11	81	234	563
	Weber	Lafayette	Both	15	78	215	512
	Lafayette	Charter	Both	0	36	124	313
	Charter	Fourth	East	0	2	27	66
	Charter	Fourth	West	0	0	41	135
	Fourth	Fifth	East	0	2	27	66
	Fourth	Fifth	West	0	0	41	135
Cherokee	Sanguinetti	SR 99	Both	0	6	34	77

**TABLE III.D-5B: (Cont.)
PROJECTED CHEL CONTOUR DISTANCES FOR STOCKTON, 2005**

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Cherokee (cont.)	SR 99	Alpine	Both	15	34	63	109
Charter	S. J. River	I-5	Both	0	19	99	272
	I-5	El Dorado	North	0	24	67	136
	I-5	El Dorado	South	0	45	156	396
	El Dorado	Wilson	Both	3	35	84	163
	Wilson	Mariposa	Both	0	24	145	406
	Mariposa	SR 99	Both	0	0	50	200
Country Club	Wisconsin	I-5	Both	0	5	29	66
	I-5	Pershing	Both	0	3	26	61
Davis	Thornton	N. City Limit	Both	0	0	21	56
	N. City Limit	Eight Mile	Both	10	23	44	77
Eighth	S. J. River	I-5	Both	0	0	14	45
	I-5	El Dorado	Both	0	0	12	42
	Airport	Mariposa	Both	0	0	9	38
Eight Mile	I-5	Jack Tone	Both	22	67	163	370
El Dorado	Howard	French Camp	Both	0	23	88	226
	French Camp	California	Both	0	17	95	262
	California	Eighth	Both	0	10	79	229
	Eighth	Fourth	Both	0	14	52	112
	Fourth	Lafayette	East	0	22	95	251
	Fourth	Lafayette	West	0	17	51	104
	Lafayette	Weber	Both	0	27	115	307
	Weber	Park	Both	0	33	130	339
	Park	Harding	Both	3	24	53	97
	Harding	Cleveland	Both	0	9	39	85
	Cleveland	Alpine	Both	0	8	42	94
	Alpine	Bianchi	Both	0	18	52	106
	Bianchi	March	East	0	20	57	115
	Bianchi	March	West	0	30	113	293
	March	Yokuts	Both	0	0	31	154

TABLE III.D-5B: (Cont.)
PROJECTED CHEL CONTOUR DISTANCES FOR STOCKTON, 2005

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
El Dorado (cont.)	Yokuts	Robinhood	Both	0	0	0	43
	Robinhood	Swain	Both	0	14	46	96
	Swain	Benjamin Holt	East	0	9	69	197
	Swain	Benjamin Holt	West	0	9	39	86
	Benjamin Holt	Hammer	Both	0	0	1	41
	Hammer	Ponce DeLeon	Both	0	0	10	43
	Ponce DeLeon	Morada	Both	0	0	0	21
Filbert	Waterloo	Fremont	Both	0	7	31	71
	Fremont	Main	Both	0	10	32	68
Fremont	Pershing	California	North	3	18	41	75
	Pershing	California	South	0	17	71	189
French Camp	I-5	Prescott	Both	32	88	210	471
Hammer	I-5	Pershing	Both	0	1	41	104
	Pershing	Lower Sac.	North	0	16	49	101
	Pershing	Lower Sac.	South	0	21	91	243
	Lower Sac.	El Dorado	North	5	32	74	140
	Lower Sac.	El Dorado	South	2	51	156	384
	El Dorado	Tam O'Shanter	North	8	34	71	126
	El Dorado	Tam O'Shanter	South	9	41	83	174
	Tam O'Shanter	West	Both	0	36	143	377
	West	E. City Limit	North	11	39	81	143
	West	E. City Limit	South	24	109	294	694
	E. City Limit	SR 99	Both	69	169	383	845
Harding	Pershing	Pacific	Both	0	9	34	75
	Pacific	El Dorado	Both	4	56	168	409
	El Dorado	California	Both	0	41	135	338
	California	West	Both	0	32	122	316
	West	Wilson	North	0	41	141	357
	West	Wilson	South	0	21	51	97
	Wilson	Waterloo	Both	0	5	34	80

TABLE III.D-5B: (Cont.)
PROJECTED CHEL CONTOUR DISTANCES FOR STOCKTON, 2005

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Hazelton	San Joaquin	California	North	0	0	0	26
	San Joaquin	California	South	0	0	0	57
	California	"B"	North	0	0	17	51
	California	"B"	South	0	0	23	100
Howard	Middle River	Endow	Both	6	32	87	206
	Endow	I-5	Both	22	66	161	367
Ijams	Bianchi	McAllen	Both	0	2	28	85
I-5	Downing	Delima	Both	185	468	1079	2398
	Downing	Charter	Both	94	271	654	1481
	Charter	Washington	Both	98	278	669	1514
	Washington	Pershing	Both	99	281	675	1526
	Pershing	Country Club	Both	41	100	193	341
	Country Club	March	Both	42	101	194	343
	March	Benjamin Holt	East	79	238	581	1324
	March	Benjamin Holt	West	33	87	172	308
	Benjamin Holt	Hammer	Both	27	77	156	282
	Hammer	Bear Creek	East	29	130	349	822
	Hammer	Bear Creek	West	11	52	118	221
	Bear Creek	Eight Mile	Both	88	250	599	1353
Jack Tone	Eight Mile	French Camp	Both	2	24	70	170
Lower Sac.	Pacific	MacDuff	Both	0	57	182	450
	MacDuff	Bear Creek	East	0	10	48	109
	MacDuff	Bear Creek	West	0	23	113	307
	Bear Creek	Eight Mile	Both	21	63	155	353
Main	Union	Wilson	Both	0	0	16	43
	Wilson	Locust	Both	0	0	35	123
	Locust	Filbert	Both	0	0	22	59
	Filbert	SR 99	Both	0	3	28	68
	SR 99	Alpine	Both	13	49	127	294
	Alpine	Jack Tone	Both	1	21	64	157

**TABLE III.D-5B: (Cont.)
PROJECTED CHEL CONTOUR DISTANCES FOR STOCKTON, 2005**

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
March	Feather River	I-5	Both	0	0	10	86
	I-5	Quail Lakes	Both	9	83	243	590
	Quail Lakes	Grouse Run	Both	10	84	246	595
	Grouse Run	Pershing	Both	0	64	202	501
	Pershing	Pacific	Both	0	47	165	421
	Pacific	El Dorado	Both	0	20	102	279
	El Dorado	West	Both	0	33	135	356
Mariposa	Farmington	SR 99	Both	6	71	212	515
	SR 99	Jack Tone	Both	38	101	237	531
Mathews	Howard	I-5	Both	26	74	178	402
McAllen	City Limit	Wilson	Both	16	47	114	260
Mendocino	Pershing	Kensington	North	0	0	11	81
	Pershing	Kensington	South	0	0	6	39
Miner	Union	Airport	Both	0	1	66	207
	Airport	Wilson	North	0	0	15	95
	Airport	Wilson	South	0	0	6	42
	Wilson	Filbert	North	0	0	7	35
	Wilson	Filbert	South	0	0	8	30
	Filbert	SR 99	Both	0	0	2	17
Monte Diablo	Louise Park	I-5	North	0	0	11	35
	Louise Park	I-5	South	0	0	6	48
	I-5	Argonne	Both	0	3	22	52
Morada	West	S. Pacific	Both	0	4	51	152
	S. Pacific	SR 99	Both	4	23	64	153
Oak	Pershing	Center	Both	0	4	24	55
	Center	California	Both	0	13	32	62
	California	Airport	Both	0	10	29	57
Pacific	Harding	Castle	Both	0	0	17	46
	Castle	Alpine	Both	0	5	27	61
	Alpine	Rosemarie	East	0	21	114	316

TABLE III.D-5B: (Cont.)
PROJECTED CHEL CONTOUR DISTANCES FOR STOCKTON, 2005

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Pacific (cont.)	Alpine	Resemarie	West	0	7	46	108
	Rosemarie	March	East	0	0	12	53
	Rosemarie	March	West	0	0	23	80
	March	Yokuts	Both	0	44	152	386
	Yokuts	Robinhood	Both	0	38	144	373
	Robinhood	Swain	Both	0	29	150	410
	Swain	Benjamin Holt	Both	0	45	169	437
	Benjamin Holt	Hammer	Both	0	28	147	405
Park	Pershing	Center	Both	0	0	18	46
	Center	California	North	0	5	22	46
	Center	California	South	0	0	24	86
	California	Airport	North	0	0	21	80
	California	Airport	South	0	4	20	44
Pershing	I-5	Acacia	East	0	2	27	66
	I-5	Acacia	West	0	0	41	135
	Acacia	Harding	East	0	15	80	219
	Acacia	Harding	West	0	13	44	94
	Harding	Alpine	Both	0	19	50	100
	Alpine	Brookside	East	0	13	45	96
	Alpine	Brookside	West	0	16	83	228
	Brookside	Robinhood	East	0	12	38	75
	Brookside	Robinhood	West	0	17	84	231
	Robinhood	Benjamin Holt	Both	0	14	46	98
	Benjamin Holt	Lincoln	Both	0	10	40	86
	Lincoln	Hammer	Both	0	9	32	65
	Hammer	Thornton	Both	0	2	26	66
Roberts	Howard	SR 4	Both	2	18	53	129
Robinhood	March	Grouse Run	Both	0	0	16	56
	Grouse Run	Pershing	Both	0	0	23	56
	Pershing	Pacific	Both	0	0	18	46

TABLE III.D-5B: (Cont.)
PROJECTED CHEL CONTOUR DISTANCES FOR STOCKTON, 2005

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Rosemarie	Romano	Pershing	Both	0	2	38	118
	Pershing	Pacific	Both	0	15	66	178
Roth	I-5	Airport	Both	20	58	139	314
Sanguinetti	Cherokee	Alpine	Both	12	44	115	266
SR 4	Woodsbro	Fresno	Both	22	64	154	350
	Charter	Jack Tone	Both	9	36	94	220
SR 26	SR 99	Jack Tone	Both	43	111	258	576
SR 88	SR 99	Eight Mile	Both	25	79	195	443
SR 99	Lathrop	Wilson	Both	178	424	955	2109
	Wilson	Eight Mile	Both	111	291	681	1524
Swain	I-5	Alexandria	Both	0	1	19	47
	Alexandria	Pacific	Both	0	8	30	65
	Pacific	El Dorado	Both	0	4	30	71
Thornton	Pacific	Hammer	Both	0	45	143	350
	Hammer	Pershing	Both	3	29	69	133
	Pershing	Davis	Both	13	44	94	173
	Davis	Wagner	Both	0	34	121	307
	Wagner	N. City Limit	East	0	22	59	117
	Wagner	N. City Limit	West	0	32	117	298
	N. City Limit	Eight Mile	Both	1	17	50	123
Waterloo	Wilson	Harding	Both	0	16	90	251
	Harding	SR 99	Both	0	16	90	251
Weber	Wilson	California	Both	0	0	0	22
	California	Center	Both	0	0	0	22
	Center	I-5	Both	0	0	45	160
West	Harding	Alpine	Both	19	87	234	552
	Alpine	Bianchi	Both	44	157	399	923
	Bianchi	March	Both	30	129	343	804
	March	Swain	Both	26	121	325	766
	Swain	Hammer	Both	7	93	279	681

TABLE III.D-5B: (Cont.)
PROJECTED CHEL CONTOUR DISTANCES FOR STOCKTON, 2005

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
West (cont.)	Hammer	Mosher	Both	36	141	369	860
	Mosher	Morada	East	0	28	154	426
	Mosher	Morada	West	0	0	28	79
	Morada	Eight Mile	Both	21	83	216	503
Wilson	Charter	Market	Both	0	23	60	119
	Market	Miner	Both	0	13	38	75
	Miner	Fremont	Both	0	19	89	238
	Fremont	Harding	North	0	20	56	112
	Fremont	Harding	South	0	29	108	280
	Harding	SR 99	Both	0	53	172	429

**TABLE III.D-6A:
PROJECTED CNEL CONTOUR DISTANCES FOR TRACY, 1985**

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Central	Third	Schulte	Both	0	0	0	11
	Schulte	Tracy	Both	0	0	0	11
Corral Hollow	Larch	Valpico	Both	6	27	73	171
Eleventh	Corral Hollow	RR	Both	0	3	51	154
	RR	Tracy	Both	0	0	15	70
	Tracy	MacArthur	Both	0	1	17	44
Grant Line	Corral Hollow	Lincoln	North	0	6	27	73
	Corral Hollow	Lincoln	South	5	15	31	57
	Lincoln	Tracy	North	0	0	4	28
	Lincoln	Tracy	South	0	2	13	30
	Tracy	MacArthur	Both	0	0	3	25
Holly	Larch	I-205	Both	0	0	0	19
	I-205	Overcrossing	Both	0	0	0	23
	I-205	Grant Line	Both	0	0	10	28
I-205	Corral Hollow	MacArthur	Both	84	228	537	1205
Lincoln	Grant Line	Eleventh	Both	0	0	0	10
Lowell	Tracy	Holly	Both	0	0	0	1
MacArthur	Eleventh	Schulte	Both	0	4	27	76
Tracy	Schulte	RR	Both	0	7	27	71
	RR	Eleventh	Both	0	0	9	56
	Eleventh	Grant Line	Both	0	7	28	62
	Grant Line	Clover	Both	0	0	20	80
	Clover	I-205	Both	0	4	32	92
	I-205	Larch	Both	0	0	20	80

**TABLE III.D-6B:
PROJECTED CNEL CONTOUR DISTANCES FOR TRACY, 2005**

ROADWAY	SEGMENT		DISTANCE FROM ROADWAY EDGE TO CNEL CONTOUR, FT				
	START	FINISH	SIDE OF RD	75 dB	70 dB	65 dB	60 dB
Central	Third	Schulte	Both	0	0	7	51
	Schulte	Tracy	Both	0	0	0	19
Corral Hollow	Lowell	Grantline	Both	71	153	330	771
Eleventh	SPRR	Tracy	Both	0	0	94	202
	Tracy	MacArthur	Both	0	0	70	151
Grant Line	Corral Hollow	Tracy	Both	0	0	68	146
	Tracy	Holly	Both	0	0	59	128
	Holly	MacArthur	Both	0	0	81	176
Holly	Larch	I-205	Both	0	0	13	52
	I-205	Overcrossing	Both	0	0	13	52
	I-205	Grant Line	Both	0	5	19	42
I-205	Tracy	MacArthur	Both	223	480	1033	2226
Lincoln	Grant Line	Eleventh	Both	0	0	4	26
Lowell	Tracy	Holly	Both	0	0	0	12
MacArthur	Eleventh	Schulte	Both	16	54	135	310
Schulte	Tracy	MacArthur	Both	0	0	68	146
Tracy	Schulte	SPRR (S)	Both	0	0	79	170
	SPRR (S)	SPRR (N)	Both	0	0	53	115
	SPRR (N)	Eleventh	Both	0	0	89	192
	Eleventh	Lowell	Both	0	0	79	170
	Lowell	Grant Line	Both	0	0	62	134
	Grant Line	I-205	Both	0	0	74	158

**TABLE III.D-7B:
PROJECTED CNEL CONTOUR DISTANCES FOR RAILROADS, 1985**

RAILROAD	SEGMENT		DISTANCE FROM RAILROAD CENTER TO CNEL CONTOUR, FT			
	START	FINISH	75 dB	70 dB	65 dB	60 dB
UP	Stockton	Sacramento	15	32	70	150
	Stockton	Modesto	2	4	9	20
	Stockton	Lathrop	30	65	140	302
	Lathrop	Altamont	44	96	206	444
ATSF	Stockton	Antioch	51	109	235	505
	Stockton	Fresno	36	77	167	360
SP	Stockton	Sacramento	53	113	244	526
	Stockton	Lathrop	73	157	339	729
	Lathrop	Fresno	57	123	265	571
	Lathrop	Tracy	32	69	150	323
	Tracy	Martinez	11	24	53	113
	Tracy	Fresno	6	13	27	59

**TABLE III.D-7C:
PROJECTED CNEL CONTOUR DISTANCES FOR RAILROADS, 2005**

RAILROAD	SEGMENT		DISTANCE FROM RAILROAD CENTER TO CNEL CONTOUR, FT			
	START	FINISH	75 dB	70 dB	65 dB	60 dB
UP	Stockton	Sacramento	24	52	112	242
	Stockton	Modesto	2	4	9	20
	Stockton	Lathrop	30	65	140	302
	Lathrop	Altamont	47	101	218	469
ATSF	Stockton	Antioch	4	8	18	39
	Stockton	Fresno	46	99	214	461
SP	Stockton	Sacramento	57	123	265	571
	Stockton	Lathrop	40	87	187	404
	Lathrop	Fresno	58	126	270	583
	Lathrop	Tracy	64	138	297	641
	Tracy	Martinez	50	108	233	502
	Tracy	Fresno	6	13	27	59

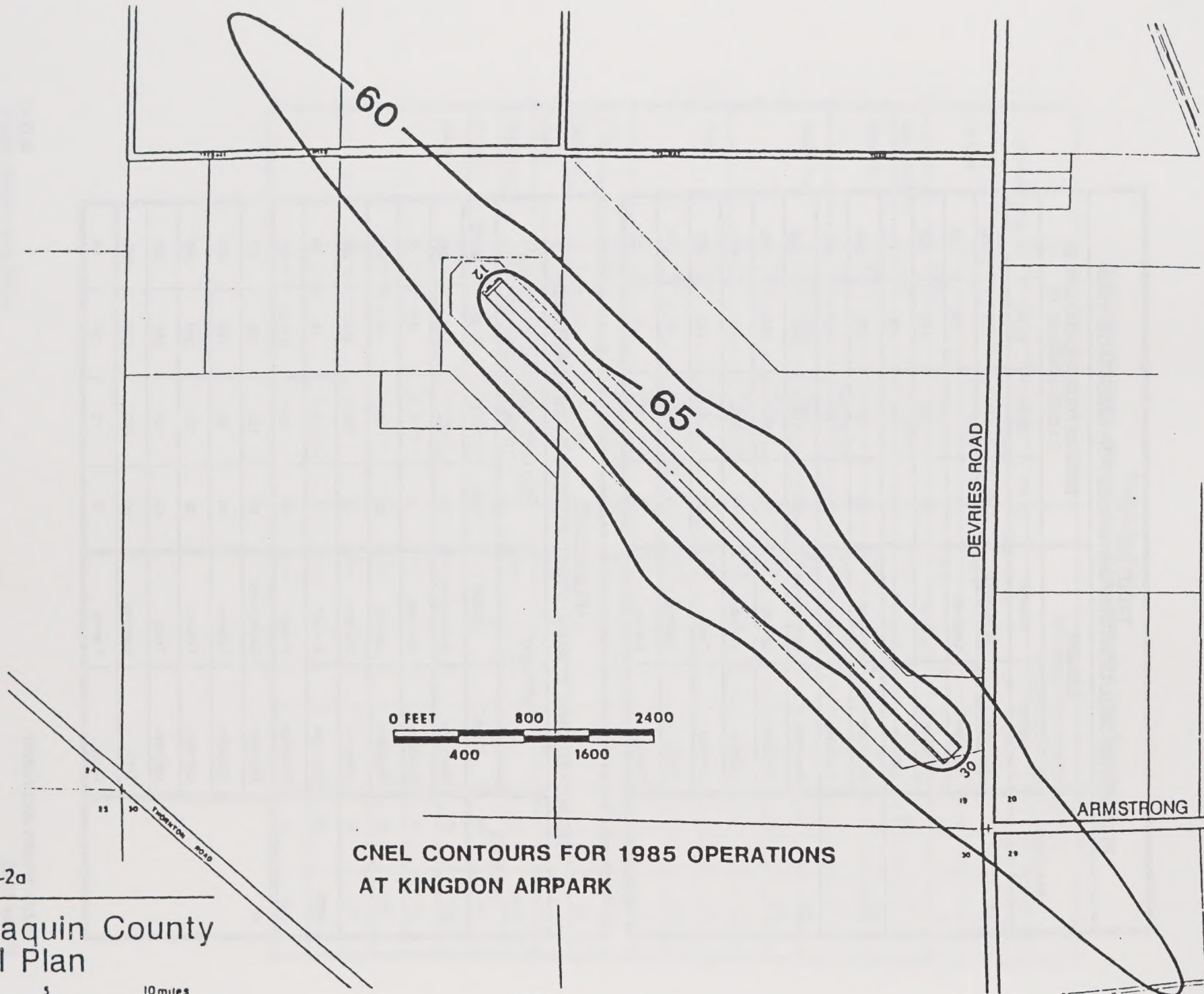


Figure III.D-2a

San Joaquin County General Plan

ay Cooke Associates

CNEL CONTOURS FOR 1985 OPERATIONS AT KINGDON AIRPARK

Source: San Joaquin County Council of Governments, Preparation of General Plan and Noise Contours, February 1986.

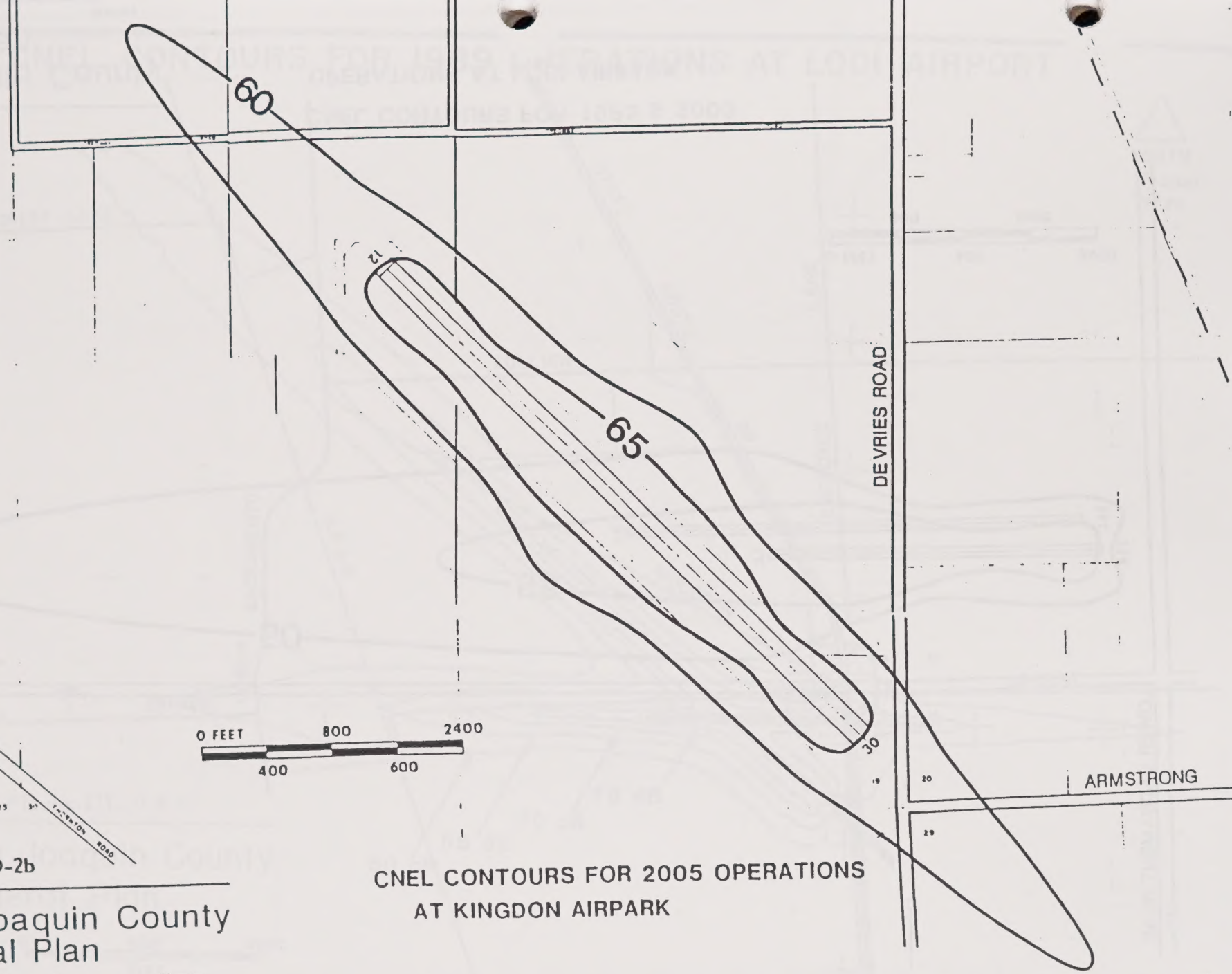


Figure III.D-2b

San Joaquin County General Plan

III.D-49



0 1 2 5 10 miles

Sedway Cooke Associates

CNEL CONTOURS FOR 2005 OPERATIONS AT KINGDON AIRPARK

Source: San Joaquin County Council of Governments, Preparation of Current and Projected Noise Contours, February 1986.

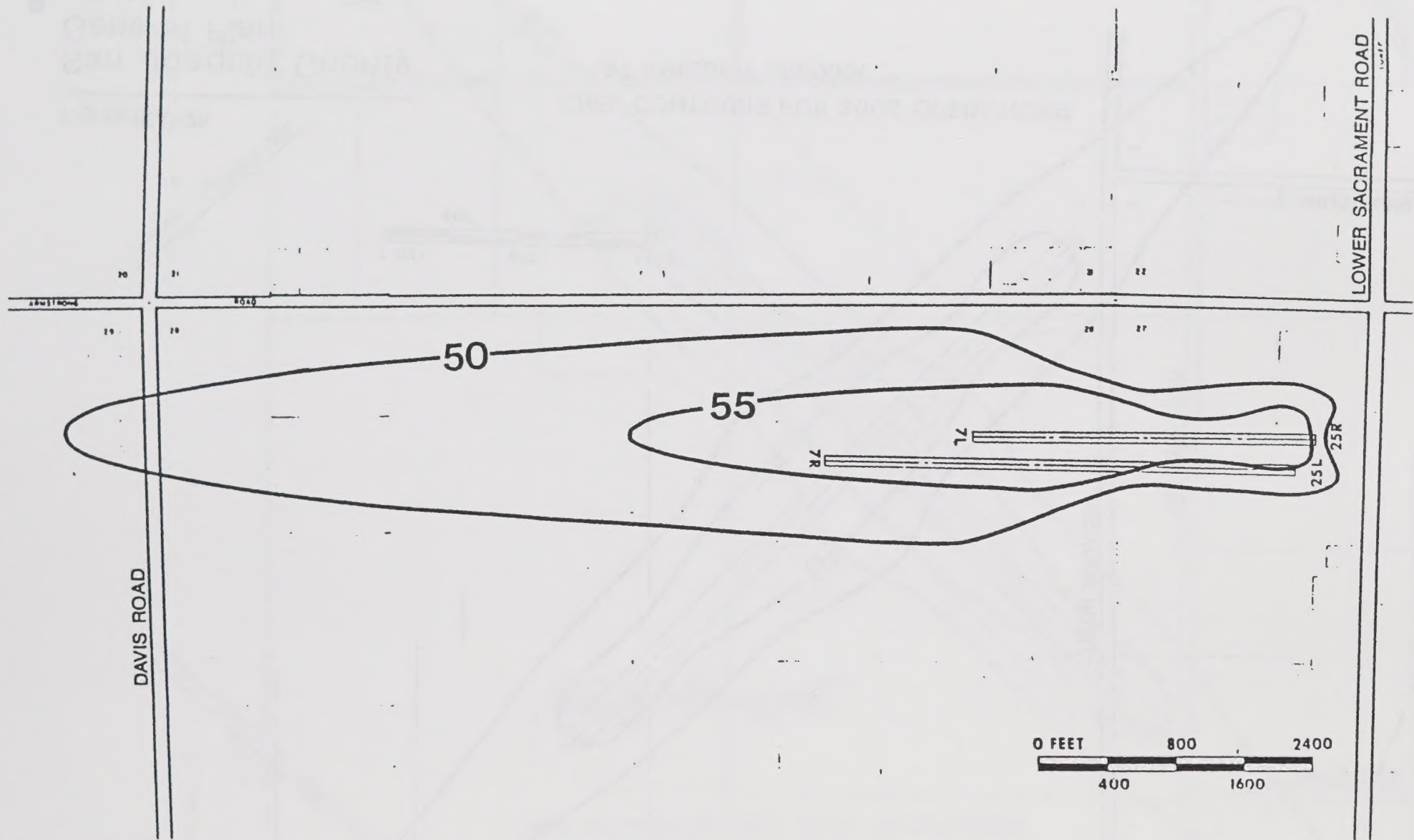


Figure III.D-3

San Joaquin County General Plan

CNEL CONTOURS FOR 1985 & 2005 OPERATIONS AT LODI AIRPARK

Source: San Joaquin County Council of Governments. Preparation of Current and



0 1 2 3 4 5 10 miles

Ray Cooke Associates



e

CNEL CONTOURS FOR 1989 OPERATIONS AT LODI AIRPORT

NORTH
1" = 2000'
6/90

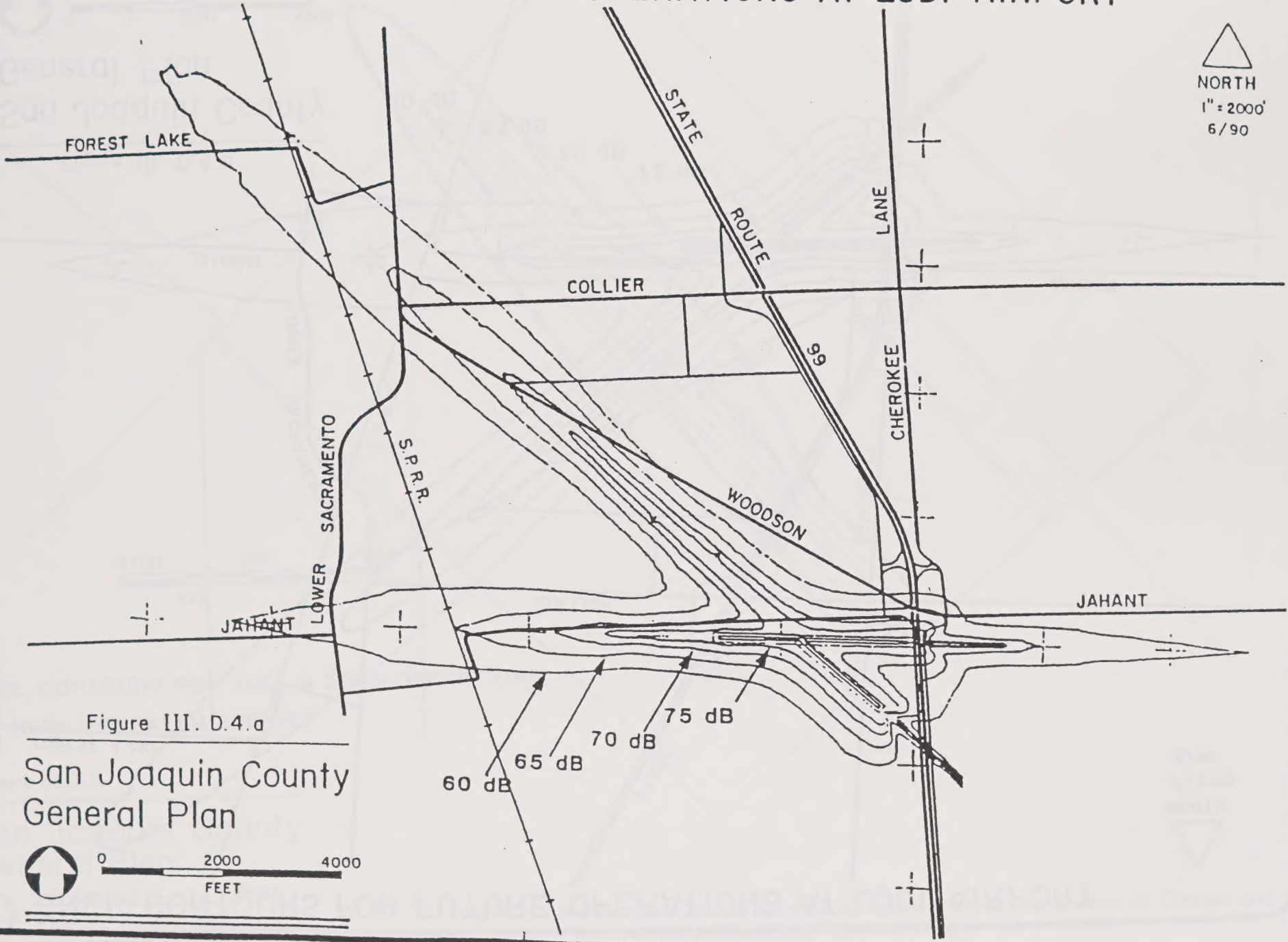


Figure III. D.4.a

San Joaquin County
General Plan

CNEL CONTOURS FOR FUTURE OPERATIONS AT LODI AIRPORT

NORTH
1" = 2000'
6/90

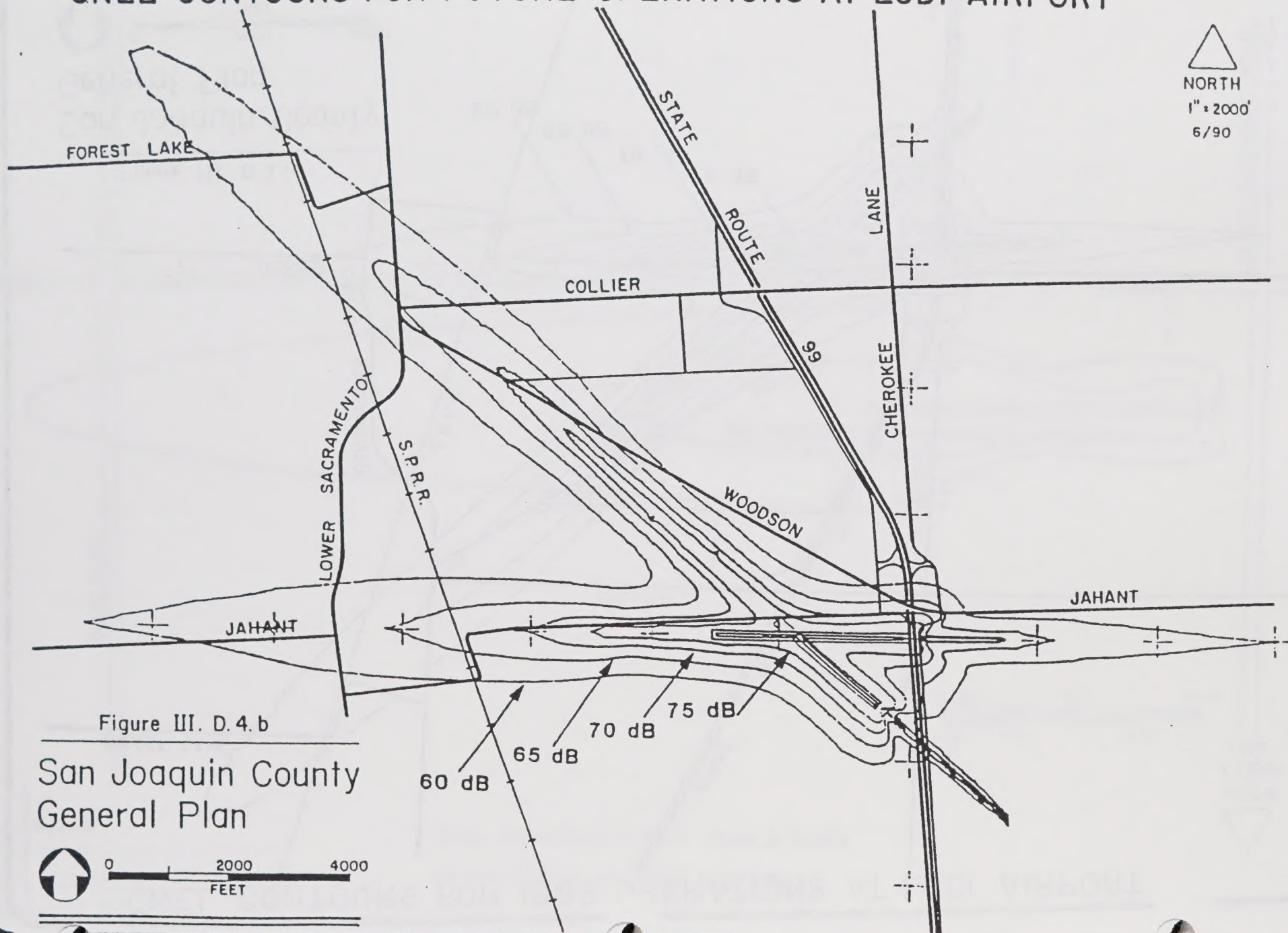
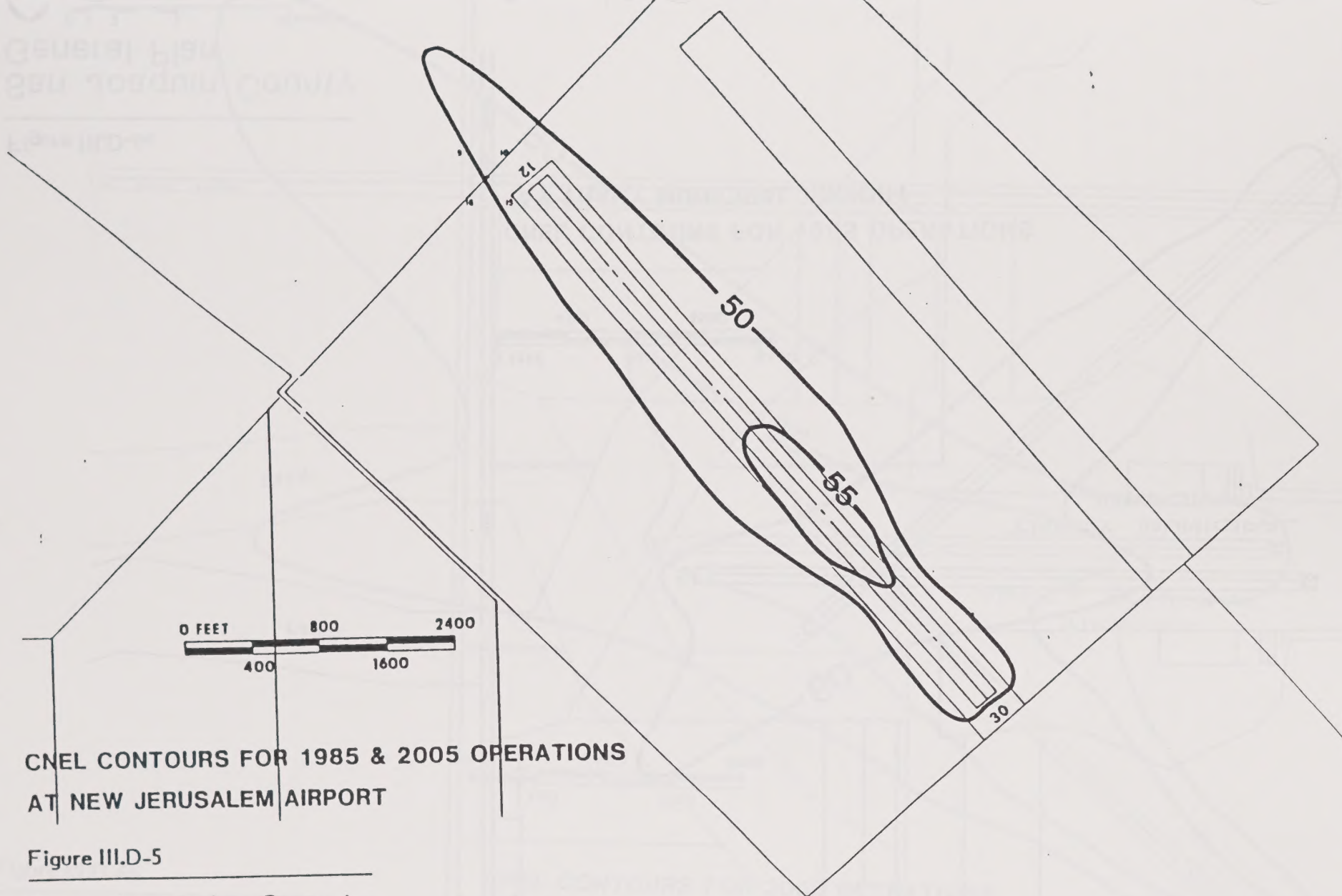


Figure III. D. 4. b

San Joaquin County
General Plan



0 2000 4000
FEET



CNEL CONTOURS FOR 1985 & 2005 OPERATIONS
AT NEW JERUSALEM AIRPORT

Figure III.D-5

San Joaquin County
General Plan



0 1 2 3 10 miles
Sedway Cooke Associates

Source: San Joaquin County Council of Governments, Preparation of Current and Projected Noise Contours, February 1986.

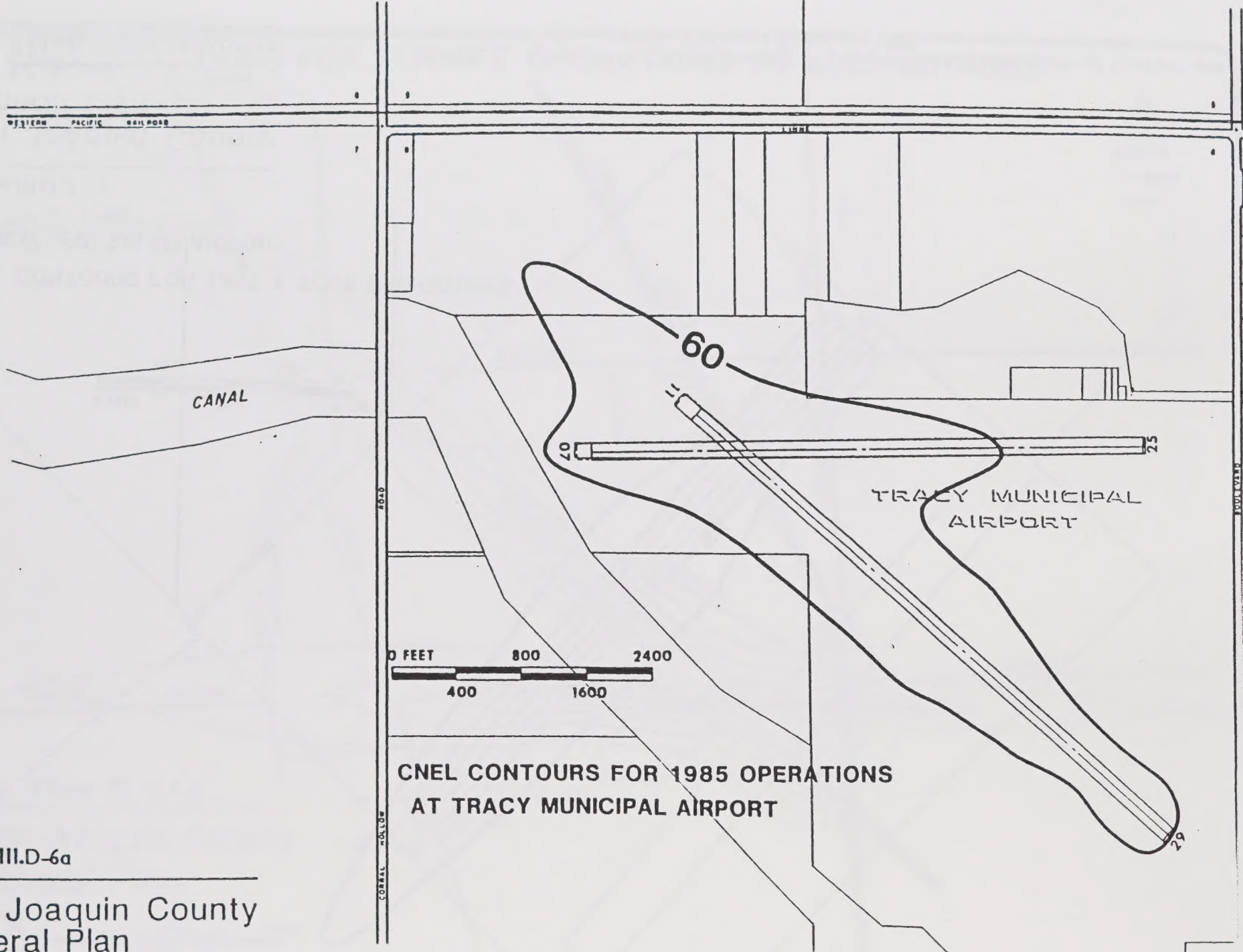


Figure III.D-6a

San Joaquin County General Plan

III.D-54



0 1 2 5 10 miles

by Cooke Associates

Source: S
F

San Joaquin County Council of Governments, Preparation of Current and
ed Noise Contours, February 1986.

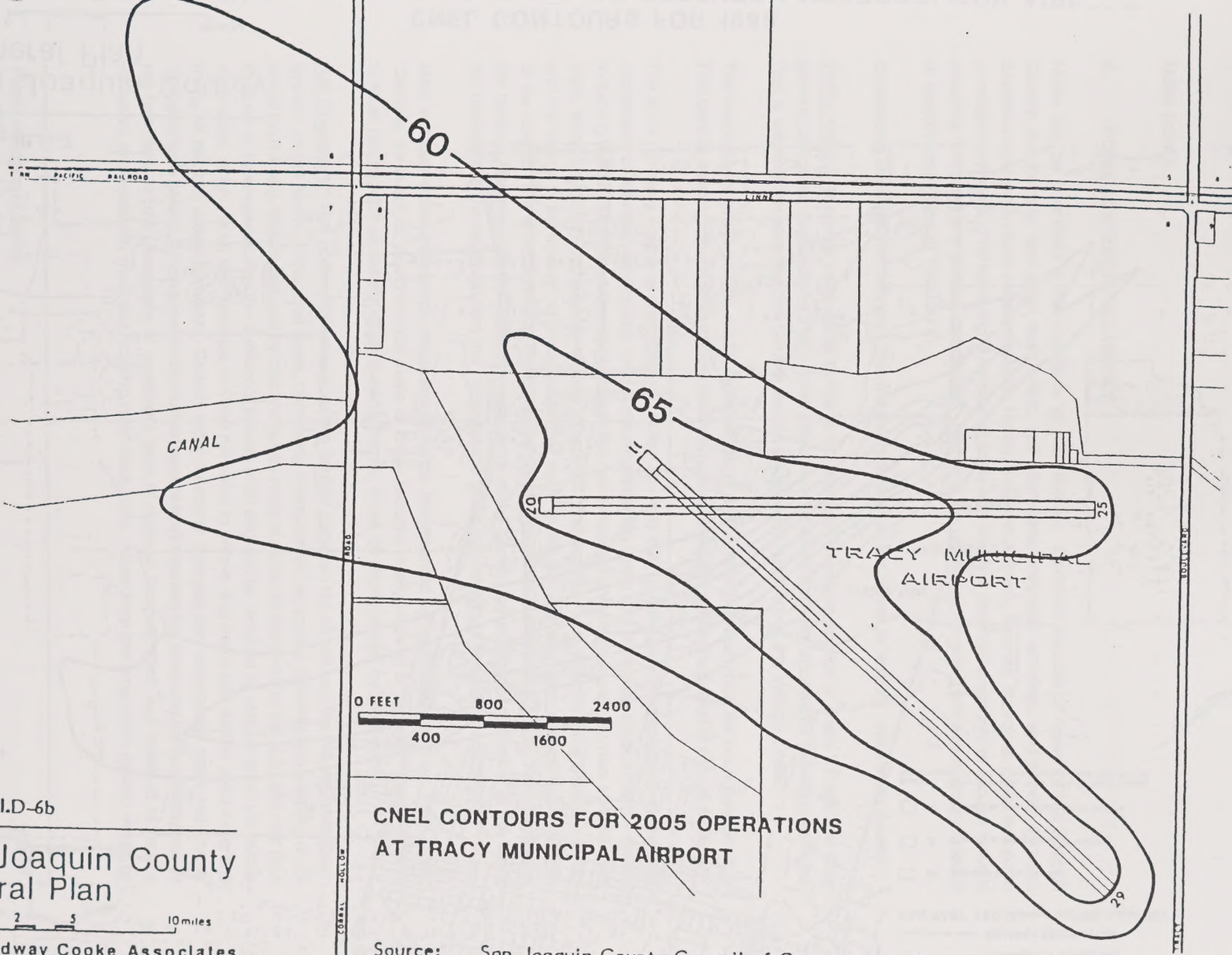


Figure III.D-6b

San Joaquin County General Plan



0 1 2 3 10 miles

Sedway Cooke Associates

Source:

San Joaquin County Council of Governments, Preparation of Current and Projected Noise Contours, February 1986.

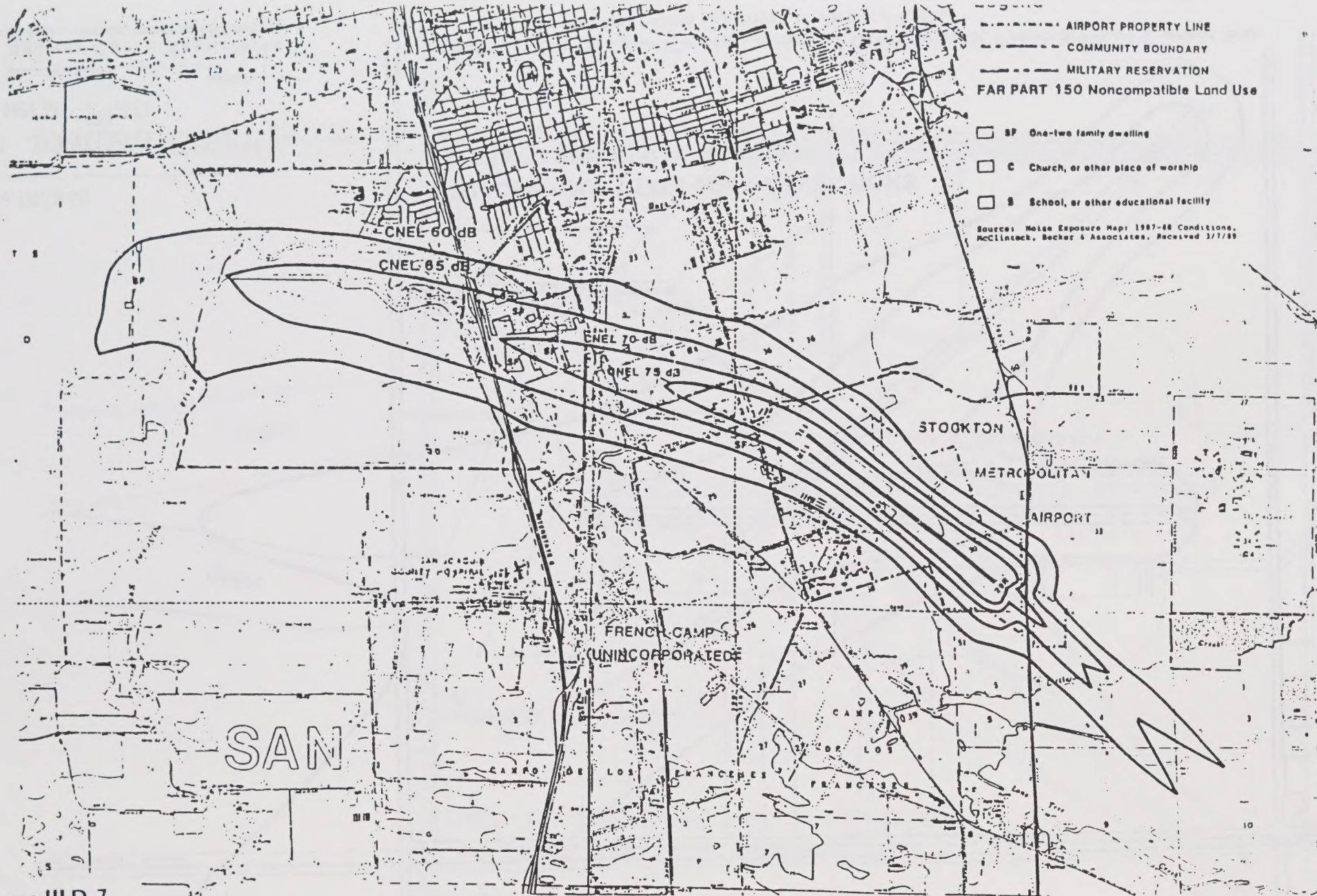
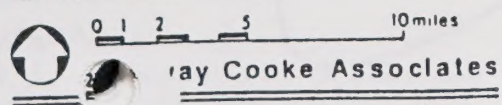


Figure III.D-7

San Joaquin County General Plan



**CNEL CONTOURS FOR 1988
OPERATIONS AT STOCKTON METROPOLITAN AIRPORT**

6. NOISE ABATEMENT MEASURES

Noise can be controlled at the source or at the receiver. Common sources of noise in San Joaquin County are freeway and local road traffic, rail operations, industrial activities, and aircraft flyovers. Sensitive receivers include residential uses, hotels, hospitals, schools, libraries, churches, parks and some entertainment uses. The following summary of noise sources and potential measures to reduce noise at sensitive receptors is a general description. Not all of the measures identified are economically feasible or directly applicable to the County.

Controlling Noise at the Source. The following measures are aimed at abating noise at its source.

Traffic Noise. Roadway traffic noise tends to be the most prevalent source of noise. There are three general principles applicably to traffic noise reduction. The first is control of noise for individual vehicles. This is beyond the scope of the County except for local enforcement of the Vehicle Code.

The second is controlling traffic, which includes routing traffic through areas which are not noise-sensitive. This can be accomplished through local roadway design and designation (e.g. arterial versus collector).⁷

The third principle concerns road design. Noise intensity can be affected by adjustments in gradient, depression or elevation of roadway, road surfacing materials, traffic flow, and noise shields. Noise shields including buildings which are located between the noise receptor and noise source; barriers include noise walls, earth berms, and, to a lesser degree, plantings. Plantings are only effective if the growth is dense and the foliage is tall enough to block the "line of sight" to the receptor and deep enough to block some of the sound. The effectiveness of structural barriers are dependent on the acoustical characteristics of the construction material, the thickness and height of the barrier, the amount of diffraction at the top of the barrier, and the distance from the noise source to the barrier and to the noise receptor.

Most of these noise attenuation measures could be implemented by agencies other than the County. Caltrans, for example, could include some of these features in any freeway or highway. Improvements to local roads, such as construction of earth berms, could be implemented by the County.

Rail Operations. Rail noise originates from the contact between the wheel and the rail, the propulsion system, or the horns. Wheel/rail noise, commonly characterized as squeal (sticking and slipping of the wheel on the rail), impact (caused by discontinuities in the surfaces of the wheel or the rail), and roar (due to small-scale roughness on the surface of wheels and rails) can be reduced by lessening rail vibrations, elimination of rail joints, maintenance to keep rail joints in proper alignment and routine machining and truing of rail and wheel surfaces. Certain other structural changes can accomplish noise reductions. These include ballast, which consists of crushed rock placed between the track and the roadbed; resilient rail fasteners, or the placement of a resilient layer of material between track and roadbed to reduce vibration; and resiliently mounted "floating slab" track beds. Noise from the propulsion system would be

reduced through technological changes and horn noise is affected by operations. Most of these measures are out of the scope of the County.⁸

Industrial Activities. Some industrial operations are a direct source of noise. Silencers can in some cases be installed.

Aircraft Flyovers. Flyovers of jet aircraft occur but are not pervasive for this area. Control of future problems will be accomplished through coordination with the County Airport Land Use Commission (the COG). See the Transportation Appendix for a further discussion of noise/land use compatibility in the airport environs.

Controlling Noise at the Receptor. Standard building construction provides some noise reduction from outside to inside. Additional noise reduction can be provided by site planning, architectural design, and acoustical construction which seeks to minimize the noise reaching sensitive receptors within a site or building.³

Site Planning. The arrangement of buildings on a site can be used to minimize noise impacts. These include:

- o Increasing the distance between the noise source and the receiver;
- o Placing non-residential land uses such as parking lots, maintenance facilities, and utility areas between the source and receiver;
- o Locating barrier-type buildings (i.e., less noise-sensitive buildings) parallel to the noise source or highway; and
- o Orienting the noise-sensitive areas away from the noise.

These techniques can often be implemented through cluster developments. Doubling the distance from a noise source can reduce its intensity by as much as 6 dBA. Noise compatible land uses such as commercial activities can act as buffers, both by distance and by use of the buildings as noise shields. A study has shown that a two-story building can reduce noise levels on the side of the buildings away from the noise source by about 13 dBA. Buildings can be oriented in such a way to reduce noise. This is effective in shielding open space areas from the noise source.

Architectural Design. Noise impacts can be reduced by separating more noise-sensitive rooms from less-noise sensitive rooms, and locating the more noise sensitive rooms furthest away from the noise source. In residences, bedrooms, living rooms, and dining rooms are most noise sensitive; kitchens and bathrooms are less so.

Solid walls or reduced window areas in the area of the noise source can cut down on the amount of noise reaching the receiver. Windows can be kept closed, although this is often highly undesirable for some residential uses. The design of balconies should be given some consideration, as improper design can cause noise to reflect into the building.

Acoustical Construction. Noise can be intercepted as it passes through the walls, floors, windows, ceilings, and doors of a building. Walls provide occupants with the most protection from exterior noise. The amount of noise protection can be increased by increased wall mass and stiffness, use of cavity partitions, increased airspace, increased stud spacing, use of staggered studs, use of resilient materials to hold the studs and panels together, addition of acoustical blankets, and sealing of cracks and edges.

Windows are one of the acoustically weakest points of a wall. Reduced window size, increased glass thickness, and use of double-glazed windows will decrease the amount of noise entering through windows. Some windows are sound attenuating even while open.

Doors are acoustically weaker even than windows, and represent a more difficult problem in terms of noise attenuation. Hollow core doors are discouraged in favor of solid core doors. Vinyl seal around the edges, gasketed stops or drop bar threshold closers can further reduce sound penetration. Floors and ceilings do not normally need to be acoustically treated; beamed ceilings, however, are acoustically weak and could be modified by the addition of a layer of fiberglass or some other noise-resistant material.

Overall interior noise levels can be reduced by extensive use of thick, heavy carpeting, drapes, wall hangings, and acoustical ceiling tiles. They cannot reduce the sound entering the building but they can reduce overall noise levels by reducing sound reverberations. Psychological noise attenuation can be accomplished by masking the noise. Techniques include air conditioning and heating systems, music, the sound of running water, or anything which reduces the perceived fluctuations in noise.

Barriers. A noise barrier is an obstacle placed between a noise source and the "line of sight" of the receiver to interrupt the path of the noise. They can be constructed of several different substances or combinations of substances, such as earth berms, walls and fences, or dense plantings of shrubs and trees.

A berm can provide noise attenuation of up to 15 dBA if it is several feet higher than the "line of sight" between the noise source and the receiver. Walls can serve the same function, reducing noise as much as 15 dBA. As mentioned earlier, landscaping is not a very effective method of sound reduction, but it is generally the most aesthetically pleasing. Often a combination of these methods proves to be the best solution.

Endnotes

1. San Joaquin County Council of Governments. Noise Element of the San Joaquin County General Plan. Prepared by Jean Danielson Freitas. 1978.
2. City of Tracy. Volume II, City of Tracy General Plan: Technical Supplement and Environmental Impact Report. Prepared by Blayney-Dyett. March 1982.
3. City of Ripon. General Plan. September 1988.
4. City of Manteca. Draft General Plan Background Report. Prepared by Mintier Harnish & Associates. March 1986.
5. City of Lodi. Background Report, General Plan Update. Prepared by Jones & Stokes, Inc. January 1988.
6. San Joaquin County Council of Governments. Preparation of Current and Projected Noise Contours for Specific Roads, Railroads, and Airports in San Joaquin County. Prepared by BBN Laboratories, Inc. February 1986.
7. Abstracted from Engineering Corporation of America. Noise Abatement Barrier Study. February 1975.
8. Abstracted from U.S. Department of Transportation. Urban Mass Transportation Administration. Urban Rail Noise Abatement Program Digest, May 1980.
9. Abstracted from U.S. Department of Transportation, Urban Mass Transportation, Federal Highway Administration, Offices of Research and Development. The Audible Landscape: A Manual for Highway Noise and Land Use. November 1974.

E. HAZARDOUS MATERIALS AND WASTES

1. INTRODUCTION

Hazardous materials has become a significant public health and safety concern since the late 1970's. The use, production, storage, treatment, and cleanup of hazardous materials and wastes will dramatically affect present and future generations. Contamination due to hazardous materials and waste could impede the implementation of this General Plan by increasing the cost of development, limiting land use options, and delay action until after necessary cleanups of contaminated sites are completed. This discussion addresses land use compatibility issues and management hazardous materials by identifying the types and location of sites and facilities which produce, use, store, or dispose of hazardous materials. In addition, the issue of household and other small-scale generators of hazardous materials and wastes are addressed. Accidents involving hazardous materials are discussed in the next chapter on Emergency Preparedness.

2. HAZARDOUS MATERIALS

Hazardous materials include all flammable, reactive, corrosive, or toxic substances which, because of these properties, pose potential to harm to the public or environment. Hazardous materials such as agricultural chemicals, natural gas and petroleum, explosives, radioactive materials and various commercial chemical substances are used , stored, or produced in San Joaquin County.

Agricultural Chemicals. Agricultural chemicals include fertilizers and pesticides (e.g., herbicides, insecticides, fumigates, fungicides). These chemicals are vital to today's agriculture, but improper use can result in toxic effects on the user, on others nearby, and on the environment. Groundwater contamination from fertilizers and pesticides is of great concern. For example, the pesticide DBPC (dibromochloropropane), which has been discovered in wells in San Joaquin County and other parts of the state, has caused wells to be shut down.¹

Both state and local agencies are making efforts to prevent contamination of ground and surface water. The California Department of Food and Agriculture (CDFA) has established the Pesticide Regulatory Program, whose goal is to keep pesticide residues out of drinking water supplies. At the local level, the County Agricultural Commissioner's Office enforces pesticide regulations that provide protection for people, animals, and the environment²

Natural Gas and Petroleum. Many miles of pipelines criss-cross the County. These pipelines carry natural gas, crude oil, and other petroleum products. A pipeline break could cause pollution of the air, soil, or groundwater.

Natural gas is thought to be less of a hazard to the public than petroleum products, because it is transported at lower pressures than petroleum products and when released, it rises and dissipates into

the atmosphere. If burning, natural gas burns vertically, while petroleum products spread and flow along the ground and are more likely to spread to nearby property.

Explosives. Explosives represent a significant hazard to land uses and a potential danger to public safety. Explosives manufacturing, storage and testing facilities are under local land use control, and permits can be conditioned to decrease the risk to the public. In addition, the County Sheriff's office issues permits for use and storage of explosives.

There is no local control over the transportation of explosive materials. The federal government has primary responsibility for regulating the transportation of hazardous substances (including explosives) on water and rail, while the California Highway Patrol is responsible for regulating transportation over the state's highways, roads and streets. Explosive materials (and three types of chemicals) are currently under route control as per Title 13 of the California Administrative Code. The Code designates routes, safe stopping places, safe parking places and inspection stops. Figure III.E-1 shows the designated routes and stops within the County.

Radioactive Materials. All types of radioactive materials (mostly low level) are used throughout the County. Low level radioactive materials are used by medical, educational, governmental, and industrial uses. Higher levels of radioactive materials are associated with governmental research, military weapons, and nuclear power plants.³

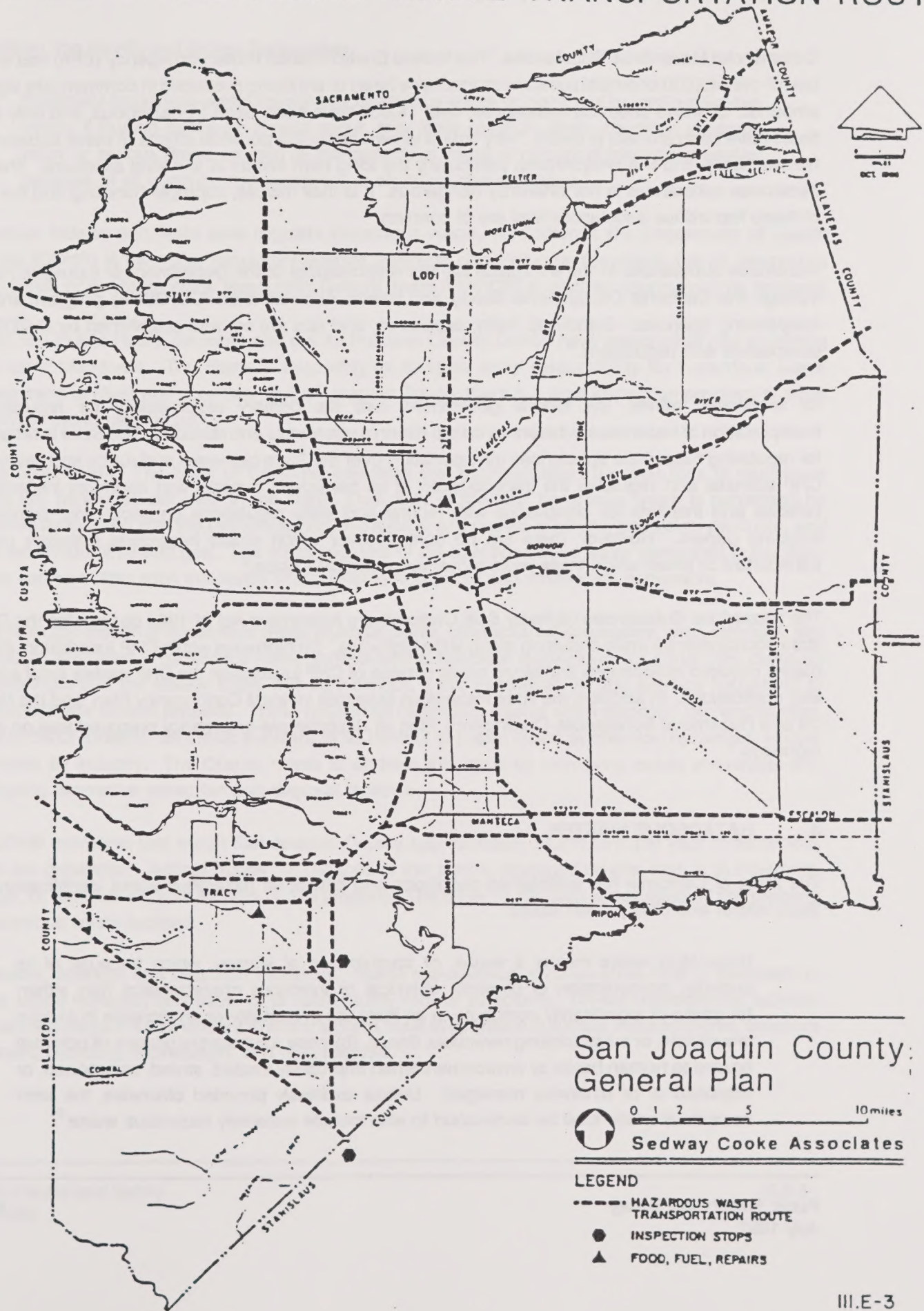
The use of radioactive material is licensed by three agencies: the State of California's Department of Health Services (DOHS), the U.S. Nuclear Regulatory Commission (NRC) and the U.S. Department of Energy (DOE). The U.S. Department of Defense (DOD) regulates the shipment of defense explosive devices with the shipments made in secret.³

On-site use of radioactive materials by the Departments of Energy and Defense are controlled by federal regulations. The state and local governments have little or no information or control of use. The DOHS has done, and continues to do, some monitoring to assess off-site impacts of major nuclear facilities in the State.

Low level/short half-life radioactive materials licensed and controlled by the State are used by medical, educational, and industrial users. The DOHS has adopted the federal regulations for packing, marking, loading, handling, and transportation of radioactive cargo. The Department of Industrial Relations has been contracted by DOHS to enforce the above regulations.³ After the above facilities finish using the radioactive materials and contaminated materials, the following actions are taken: 1) unused and leftover radioactive materials are returned to the manufacturer for reprocessing or disposal; 2) contaminated materials are either sent to a low level radiation disposal site or kept on site until radioactivity is reduced to below natural background level and the material is disposed of in the same manner as regular wastes.^{4,5}

The State Vehicle Code requires the California Highway Patrol (CHP) with the help of DOHS to adopt routes to be used to transport fissile III radioactive materials. Proposed routes within San Joaquin County are Interstates 5, 205 and 580.

Figure III.E-1 HAZARDOUS WASTE TRANSPORTATION ROUTE



Commercial Hazardous Substances. The federal Environmental Protection Agency (EPA) has an inventory of over 43,000 chemical substances that have been or are being produced in commercially significant amounts. Of these chemical substances, over 14,000 have been listed as hazardous, and only a few of these have been studied in depth. Very little is known about the potential effects of these substances on human health and the environment, particularly the long term effects of low level exposure. The use of hazardous substances is not inherently dangerous. It is their misuse, improper handling and the wastes of these hazardous substances that are of concern.

Hazardous substances in the workplace are the responsibility of the Department of Industrial Relations through the California Occupational Safety and Health Administration (Cal/OSHA) program and other cooperating agencies. Standards, limits, exposures, and lists are set and established by Cal/OSHA for compliance with regulations.³

As mentioned earlier, the federal government has the primary responsibility for regulating the transportation of hazardous substances on the nation's waterways and railroads. The State is responsible for regulating hazardous substances transportation over the State highways and roads and streets. The CHP licenses and regulates the transportation of all hazardous material and conducts inspections of vehicles and inspects for compliance with federal and state regulations on packaging, signing, and shipping papers. However, there are no controls over which routes hazardous materials can be transported or times which these route movements can take place.³

The Hazardous Substances Highway Spill Containment Abatement Act of 1980 designates the CHP as state coordinator for spills occurring along state highways. On highways within CHP jurisdiction, the CHP makes required notifications and along roads outside of CHP jurisdiction the CHP assists local agencies with notifications. In addition, the state Hazardous Materials Incident Contingency Plan, and the National Oil and Hazardous Substances Contingency Plan all describe pre-emergency preparedness on and off highways.³

3. HAZARDOUS WASTES

The State of California has established definitions and criteria for hazardous waste identification. The State Health and Safety Code states:

Hazardous waste means a waste, or combination of wastes, which because of its quantity, concentration of physical, chemical or infectious characteristics may either: (a) cause or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness, (b) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported, or disposed of or otherwise managed. Unless expressly provided otherwise, the term hazardous waste shall be understood to also include extremely hazardous waste.⁶

In addition, the Health and Safety Code states:

Extremely hazardous waste means any hazardous waste or mixture of hazardous wastes which, if human exposure should occur, may likely result in death, disabling personal injury or serious illness caused by the hazardous waste or mixture of hazardous wastes because of its quantity, concentration, or chemical characteristics.⁷

Numerous federal and State laws regulate hazardous waste. In California the Department of Health Services (DOHS) is the major regulatory agency, although depending on the waste, the Air Resources Board (ARB) or the State Water Resources Control Board (SWRCB) or another agency may be involved.

Locally, the Public Health Services and the Air Pollution Control District have responsibility for enforcing some state standards. The State is beginning to delegate more responsibility for hazardous waste management to cities and counties. In San Joaquin County there is a local inspection program of small hazardous waste generators.⁸

Waste Generation. The State of California estimates that approximately 10 million tons of hazardous wastes are generated per year in the state. Over 65% of the total hazardous waste is generated by industries associated with the manufacturing of chemical and related products, petroleum products, and in the extraction of oil and gas. The remaining 35% of the total hazardous waste generated in the state is from sources other than industries which include household and small-scale generators.

Household generation of hazardous waste (such as paints, disinfectants, degreasers, oven cleaners, and shampoos) is an area of hazardous waste generation that has been largely ignored. Other than dumping the chemicals into the weekly trash, it is very difficult, if not impossible, for the average household to dispose of these wastes properly. These household hazardous wastes when disposed into landfill sites, begin to decompose to form toxic substances as harmful to public health as chemical hazardous wastes generated by industry. The County needs to address this issue by increasing public awareness and developing alternative collection and disposal facilities.

The DOHS estimates that within San Joaquin County approximately 33,270 tons per year of hazardous waste are generated. Approximately 17,780 tons of this total is managed on-site, that is, in treatment, storage, or disposal facilities located on the property. The other 15,490 tons is managed off the property at hazardous waste facilities.

Treatment, Storage and Disposal Practices. Waste management involves some form of treatment to render waste nontoxic, less toxic, or to substantially reduce its volume. On-site management typically involves discharge of dilute effluent to sewer system, solar evaporation in surface impoundments, chemical treatment, recycling, incineration, and land disposal.

Currently, off-site management of hazardous wastes primarily consist of land disposal techniques. The increasing costs of liability and potential cleanup factors for these sites, and the decrease in the availability of land disposal sites has encouraged the development of new alternative technology facilities. These alternative technologies include recycling; chemical, physical and biological processes; incineration; and stabilization and solidification.

Hazardous waste may be disposed of in Class I and Class II-I landfill sites. The class of a site is determined by the SRWQCB. There are seven Class I disposal sites within the state. The closest ones to San Joaquin County are in Martinez and King City. Class I hazardous waste land disposal facilities may accept all types of hazardous waste (with few exceptions), while Class II-I facilities accept only certain specified types of hazardous waste. Transportation routes for hazardous wastes are shown in Figure III.E-1.

The State has estimated that 65% to 80% of all hazardous wastes are disposed into either sewer systems or surface water both legally and illegally. Generally these wastes are contained in rinse water, which are high volume and low toxicity. Most of the dischargers are under Waste Discharge Requirement Permits from the State Regional Water Quality Control Board (SRWQCB). SRWQCB sets limits on the amount and kinds of discharge allowed. Sewage sludge materials may at times be handled as hazardous wastes because of their concentration of heavy metals and synthetic organic chemicals.⁹

Since comprehensive information on the types and volumes of wastes and the identity of all waste generators are unknown, the amount of illegal dumping of hazardous materials is also unknown. There are basically three types of illegal dumping of hazardous materials:

- o Illegal dumping into sewer systems;
- o Illegal dumping at Class II and Class III disposal sites; and
- o Other illegal "midnight" dumping (e.g., along roads, into streams and creeks, on property in sparsely populated areas).

Between January 1, 1988 and December 31, 1989, the San Joaquin County Office of Emergency Services reported 45 incidents of illegal dumping.¹⁰

4. LOCAL MANAGEMENT

Local responsibility for hazardous materials lies with the Public Health Services and the Office of Emergency Services.

Public Health Services. The County Board of Supervisors has designated San Joaquin County Public Health Services as the local agency responsible for the administration and enforcement of hazardous

material regulations. The Environmental Health Division of Public Health Services has four areas of concern in its waste management program: 1) hazardous wastes, 2) underground storage tanks, 3) emergency services response, and 4) infectious wastes. Public Health Services is responsible for the local implementation of the Sher Bill (Health and Safety Code Section 25280-25289) which regulates the storage of hazardous liquids in underground storage tanks. Generally, the program requires that all facilities storing hazardous substances in underground tanks have a permit and that the storage tanks meet minimum design standards set by Public Health Services.

Office of Emergency Services. The responsibility of the San Joaquin County Office of Emergency Services (OES) includes effective planning for emergencies including those related to nuclear power plants and hazardous material incidents. In the area of hazardous materials, the OES coordinates planning, responds to emergencies, improves procedures for notification and response times for agencies involved in incidents, provides training for first responders, businesses, and other governmental agencies including Public Health Services and the Public Works Department. Hazardous materials training includes such topics as decontamination procedures and techniques, chemical identification of unknown materials, basic awareness, protective clothing and sampling techniques.

OES has participated in preparation of an emergency response plan for the Rancho Seco nuclear power plant operated by the Sacramento Municipal Utility District (SMUD). Because Rancho Seco presents a potential radiation hazard, periodic exercises are held to ensure that responsible agencies are able to protect the public in case of an emergency.¹¹

The County Board of Supervisors designated the Office of Emergency Services as the lead agency in the development and implementation of a county hazardous material management plan. A.B. 2185, chaptered in the California Health and Safety Code Sections 25500-25545, creates a substantial local role in the regulation of hazardous materials handling and spills. The County is required by law to prepare and implement the following provisions.

- Establish an inventory and information system of storage and location of hazardous materials within the county;
- All facilities storing hazardous materials and wastes in specific quantities on-site must file a Hazardous Materials Management Plan with the Office of Emergency Services;
- Business plans approved by the Office of Emergency Services shall be required of all companies using hazardous materials or generating hazardous wastes. New uses involving hazardous materials or wastes shall not be permitted without an approved business plan. These plans would map and inventory all hazardous materials, and contain a contingency plan for accidents;

- Financial responsibility for spills or unauthorized discharge of hazardous materials would rest with the user. Adequate assurances of financial responsibility shall be required;
- Information shall be available to the public, to the extent permitted by California Public Records Act and other applicable laws; and
- Prepare area response plans that will incorporate inventory data, training for emergency responses, and evacuation plans.
- All facilities generating hazardous waste must obtain an EPA number and must be registered with the State Department of Health Services and with Public Health Services.

San Joaquin County Toxic Task Force. In September 1985, the San Joaquin County Toxic Task Force was formed. Its purpose is to:

- Provide a public forum concerning toxic hazards in San Joaquin County and the risks the toxics pose to public health;
- Review problems of pollution from other neighboring counties;
- Prevent toxic sites by reviewing factors local agencies should consider before approving projects;
- Monitor status of toxic contamination in the County by reviewing toxic regulating agencies; and
- Make recommendations regarding ways to improve effectiveness of toxic regulatory activities and provide County residents with accurate, timely information on toxic hazards.¹²

Uniform Fire Code. San Joaquin County has adopted the Uniform Fire Code. The adoption of the Code permits regulation of hazardous chemicals that may become fire hazards. Article 80 of the 1970 edition of the Uniform Fire Code is concerned specifically with storage, transport, and handling of hazardous chemicals. The fire code is implemented by the County Fire Warden, the fire districts, and the County Building Division.

Land Use Planning. Some aspects of hazardous material management can be controlled through land use planning and, specifically, the processing of permits. In the planning permit process, two main tools are available for regulating potential hazards caused by the use of hazardous chemicals by various land uses, the California Environmental Quality Act (CEQA) process and the discretionary land use permit.

CEQA. The CEQA process allows for the gathering of information so that a determination can be made regarding the significant adverse environmental impacts of a project. An environmental impact report could be required as part of this process. If negative impacts are identified mitigation measures can be found and applied as conditions on a discretionary permit. In other words, if hazardous conditions exist from a proposed land use concerning, for example, hazardous materials, conditions can be placed on the discretionary permit to mitigate any potential hazard.

Discretionary Permit. A discretionary land use permit allows a planning agency to deny, approve, or approve with conditions a proposed project based on given data, ordinance requirements, and adopted policies. Information about known hazardous materials associated with the proposed use can be analyzed and a decision made concerning their use.

There are at least three other ways land use planning can be involved in hazardous materials management: risk assessment, a right-to-know ordinance, and identification of locations of hazardous materials sites of existing or potential health hazard.

Risk Assessment. Risk assessment can be used to determine the kinds and types of exposure expected from a use; populations that could be exposed to hazard; a safety analysis of the use; and health risk, and acute and chronic health impacts.

Right-to-Know Ordinance. A right-to-know ordinance is intended to allow a community to gather information on how hazardous material is used and handled in its area. This basic information is used to develop appropriate strategies to minimize and prevent potential hazardous material exposures. The authority for the County to establish a right-to-know ordinance exists under Chapter 6.95 of the California Health and Safety Code and under Superfund Amendment and reauthorization Act (SARA) of 1986. By appointment of the Board of Supervisors, the office of Emergency Services administers the right-to-know ordinance locally.

A Disclosure Information System provides the following:

- The chemical names of hazardous substances and the types of hazardous wastes used, stored, handled, produced and released in the County by specific location;
- The approximate quantities of hazardous materials used, stored, handled, produced and released in the County by specific location; and
- The known chemical properties, health and emergency response information that is available on the hazardous material in the County.

This type of information is needed and can be used by firefighters, health, officers, community residents, medical providers, law enforcement personnel, land use planners, and elected officials. The information could be used in:

- Emergency response and cleanup activities;
- Pre-emergency response planning and training;
- Long range policy and planning activities;
- Enforcement and surveillance programs; and
- Public information dissemination programs.¹³

Hazardous Site Identification. Through the collection of hazardous material information available from Federal, State and local agencies, a list and/or map of known hazardous waste user and abuser sites can be produced to identify these sites for land use planning purposes (e.g., Hazardous Waste Facility Permits, State listing of Potential Hazardous Waste Properties, the State Abandoned Sites program list, State and Federal Superfund lists, local list of small hazardous waste generators). Once locations are known to local officials analysis and action can be taken, both from a planning standpoint and a political standpoint.

5. HAZARDOUS WASTE SITES

Hazardous Waste Facility Permits. The Department of Health Services (DOHS), Toxic Substances Control Division, is authorized by the EPA to issue Resource Conservation Recovery Act (RCRA) equivalent permits to facilities that store and/or treat hazardous wastes in tanks and containers. The DOHS is also authorized under the California Administration Code to issue its own type of hazardous waste permit. Both the State and the RCRA hazardous waste permits usually are known as Hazardous Waste Facility Permits. Hazardous Waste Facility Permits are issued for the storage, treatment, or disposal (ponds and piles) of hazardous waste.⁹

Within San Joaquin County, two Hazardous Waste Facility Permits have been issued and two permits are under study. The permits issued are for McCormick and Baxter Creosoting Company and Tracy Defense Depot. McCormick and Baxter, located at Pershing and Washington Streets, in Stockton, operates a wood preserving facility that produces waste on site, primarily waste liquids and sludges. These wastes are periodically transported to a Class I site outside the County for disposal.¹⁴

Tracy Defense Depot, located on Chrisman Road southeast of the city of Tracy, has been issued a container storage permit by DOHS. The general types of waste handled include motor oils, other petroleum products, solvents, process chemicals, and other chemicals that have passed their shelf-life. All potential hazardous wastes are either resold, recycled, or transported to a Class I site for disposal.¹⁴

The two hazardous waste permits under study by DOHS are temporary storage facilities for PCB transformers at the Stockton Development Center and Deuel Vocational Institution.¹⁴

Potential Hazardous Waste Properties. The Toxic Substances Control Division of DOHS has prepared a list of potential hazardous waste properties. The list was compiled after review of federal and state applications for hazardous waste facility permits. Generally, facilities selected for inclusion on the list of potential hazardous waste properties indicated on their federal or state applications for a hazardous waste facility permit that they either dispose to the land, or would potentially dispose to land through treatment or storage in surface ponds, waste piles, or land treatment. The listed facilities are removed from the list if they are issued a hazardous waste facility permit that indicates that their operation includes only storage or treatment of hazardous waste and does not include disposal.

The following is a list of Potential Hazardous Waste Properties as of May 29, 1984:¹⁴

1. Forward Incorporated, Austin Road, seven miles southeast of Stockton, CA.
2. J.R. Simplot, 16777 Howland Road, Lathrop, CA.
3. Lawrence Livermore Lab - Site 300, Corral Hollow Road, Livermore, CA.
4. Physics International Co., Three and 2/10 miles west of I-580 Corral Hollow Rd. Tracy, CA.
5. Sharpe Army Depot, Roth Road, Lathrop, CA.

DOHS Listing of Hazardous Waste Sites. The Health and Safety Code was amended by AB 129 in 1985. This law requires the Department of Health Services (DOHS) to develop a site-specific expenditure plan for appropriation from the Hazardous Substance Cleanup Bond Act funds. This amendment to the Code eliminated the former State Priority Ranking List (SPRL) of hazardous sites and replaces it with a new listing consisting of three categories of sites. The last SPRL was issued by the State in October 1985 and contained 222 sites.¹⁴

AB 129. The listing mandated by AB 129 contains three categories of sites (as of May 1986):

1. These Category 1 sites in San Joaquin County are being remediated by the responsible parties pursuant to and in conformance with a cleanup order or agreement with DOHS.
 - a. Lika Corp., Field Avenue Annex
 - b. Lika Corp., Navy Drive Facility
 - c. McCormick and Baxter
 - d. Acme Galvanizing
 - f. Arcady Oil/ SP Pipeline

- g. Kearney KPF
 - h. Lustre-Cal
-
- 2. Lague Sales is the only Category 2 site in San Joaquin County being studied for cleanup by DOHS where there are no identifiable responsible parties or the responsible parties have failed to comply with a cleanup order or agreement. The sites are finally transferred to Category 1 or 3.
 - 3. There are no sites in San Joaquin County that have been fully studied by DOHS and are priority ranked for state-funded clean-up.

National Priorities List. The DOHS also lists separately those National Priorities List (NPL) sites not included in the above lists. Marley Cooling Tower Company has been designated an NPL site. NPL sites are also RCRA enforcement/closure sites, the responsibility of EPA.

Federal Facility Clean-Up Sites. The following list of sites maintained by DOHS are Federal Facility Clean-up workplan sites.

- 1. Tracy Defense Depot
- 2. Naval Communications Center, Rough & Ready
- 3. Sharpe Army Depot

Uncategorized Sites. The DOHS maintains a separate list of uncategorized sites. Initially, these sites represented those sites on the SPRL that did not fit the AB 129 categories. These sites are all known hazardous waste sites which have been formally evaluated and confirmed by DOHS, but not yet categorized.

- 1. Brea Agricultural Services
- 2. Lodi (Linds) Airport
- 3. Lodi Door and Metal Company
- 4. Southern Pacific Transportation Co., French Camp

Potential Hazardous Sites. The DOHS also maintains a list of reported hazardous waste sites that have not been fully documented. These sites have been identified by responsible parties but have not been formally evaluated by DOHS.

- 1. America Forest Products - Stockton
- 2. Georgia Pacific - Tracy

6. LANDFILLS

A risk of contamination from hazardous waste disposal exists at the County's solid waste disposal facilities. The contamination risk is two-fold, illegal dumping and disposal of household hazardous waste, e.g., household cleaners, household chemicals, and used motor oils. In December 1982, Tracy Defense Depot mistakenly dumped 12,000 pounds of barium hydroxide lime (a hazardous chemical) into the Corral Hollow Landfill. The hazardous chemical was removed from the landfill and taken to a Class I landfill.¹⁵ A controlled monitoring program of waste disposal in the County's landfills is required.

Hazardous Materials in Underground Containers. Underground storage containers have been found to be a source of contamination of soil and groundwater. Owners of underground containers holding hazardous materials are required by the Sher Bill (Health and Safety Code Section 25280-25289) to register their underground containers. The registration law covers tanks, pits, ponds, and lagoons that are partially below ground level and which are used to store gasoline, solvents, petroleum wastes, industrial chemicals or other hazardous materials.⁸

The underground containers registration program will be followed by a regulation program to be implemented by cities and counties. The County Board of Supervisors has directed that the San Joaquin Public Health Services be the County agency responsible. Under the program, those who own underground tanks must have adequate leak detection, maintain records, and report spills. New tanks must be properly constructed under State or locally developed guidelines.

Other containers (not underground) such as pits, ponds and lagoons, are covered by State legislation, and regulations recently adopted by the State Water Regional Water Control Boards, which are implementing this program.

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3. Results

4. Discussion

The first part of the paper discusses the theoretical background of the study. It starts with a brief overview of the research area and then moves on to a more detailed discussion of the specific issues that the study addresses.

The second part of the paper describes the methodology used in the study. It includes a detailed description of the data collection process, the sample characteristics, and the statistical methods used to analyze the data.

The third part of the paper presents the results of the study. It starts with a summary of the main findings and then provides a more detailed discussion of the results for each of the research questions.

The fourth part of the paper discusses the implications of the study. It includes a discussion of the theoretical contributions of the study, the practical implications of the findings, and the limitations of the study.

The fifth part of the paper concludes the study. It summarizes the main findings and provides a final discussion of the implications of the study.

The sixth part of the paper provides a detailed discussion of the results for each of the research questions. It includes a discussion of the statistical significance of the findings and a discussion of the practical implications of the results.

The seventh part of the paper discusses the limitations of the study. It includes a discussion of the methodological limitations, the limitations of the sample, and the limitations of the statistical methods used.

The eighth part of the paper discusses the implications of the study. It includes a discussion of the theoretical contributions of the study, the practical implications of the findings, and the limitations of the study.

The ninth part of the paper concludes the study. It summarizes the main findings and provides a final discussion of the implications of the study.

The tenth part of the paper provides a detailed discussion of the results for each of the research questions. It includes a discussion of the statistical significance of the findings and a discussion of the practical implications of the results.

The eleventh part of the paper discusses the limitations of the study. It includes a discussion of the methodological limitations, the limitations of the sample, and the limitations of the statistical methods used.

The twelfth part of the paper discusses the implications of the study. It includes a discussion of the theoretical contributions of the study, the practical implications of the findings, and the limitations of the study.

The thirteenth part of the paper concludes the study. It summarizes the main findings and provides a final discussion of the implications of the study.

The fourteenth part of the paper provides a detailed discussion of the results for each of the research questions. It includes a discussion of the statistical significance of the findings and a discussion of the practical implications of the results.

The fifteenth part of the paper discusses the limitations of the study. It includes a discussion of the methodological limitations, the limitations of the sample, and the limitations of the statistical methods used.

The sixteenth part of the paper discusses the implications of the study. It includes a discussion of the theoretical contributions of the study, the practical implications of the findings, and the limitations of the study.

The seventeenth part of the paper concludes the study. It summarizes the main findings and provides a final discussion of the implications of the study.

The eighteenth part of the paper provides a detailed discussion of the results for each of the research questions. It includes a discussion of the statistical significance of the findings and a discussion of the practical implications of the results.

The nineteenth part of the paper discusses the limitations of the study. It includes a discussion of the methodological limitations, the limitations of the sample, and the limitations of the statistical methods used.

F. EMERGENCY PREPAREDNESS

1. INTRODUCTION

An emergency is a life-, property-, or environment-threatening incident, particularly one which occurs suddenly or unexpectedly. The resulting damage is determined by the nature of the incident and the response to it. In severe disasters, the reaction to an emergency is often the major determinant of the severity of its impact, since mass-confusion can cause more damage than the emergency itself. The purpose of emergency preparedness is to minimize threats to public safety by preparing and planning adequate response to potential emergencies. The County must anticipate possible needs and be able to respond to all emergency situations to the fullest extent of its resources.

Identification, planning, coordination, and preventive action are the key elements of emergency preparedness. Preventative actions such as building on stable, flood-free roads; proper storage and handling of hazardous materials; fire marshall prefire inspections; railroad crossing controls; airport clear zones; and safety education classes do save lives and protect property and the environment. In addition, the County must identify and recognize the potential hazardous situations that can not be prevented and plan effective responses. County capabilities in the areas of facilities, equipment, and trained manpower must also be identified before alternative courses of action can be plotted. All sectors of the County should be involved in planning how to best meet the objectives of emergency preparedness:

- The saving of lives;
- The preservation of property; and
- The continued functioning of the social and physical system.

Emergencies which affect a wide geographic area, several different public agencies, or a large number of people present the most complicated response problems. The more demand the emergency places on "central facilities" and "lifelines"--hospitals, police and fire departments, transportation routes and utilities--the more difficult a coordinated and orderly response becomes. The adverse impacts of an emergency can be lessened if agencies and individuals respond in a comprehensive, rational fashion. The assurance of a rational response requires thorough preparation so that all people understand what to expect in emergency situations.

2. OFFICE OF EMERGENCY SERVICES

The County Board of Supervisors has designated the Office of Emergency Services (OES) as the single coordinating center for major emergency activities. In cooperation with others, OES maintains and oversees the Multi-Hazard Functional Planning Guidance, a comprehensive disaster preparedness program. OES, during a major emergency, is granted emergency powers to control and direct emergency operations, obtain vital supplies and equipment, recruit necessary personnel, and make and issue rules

and regulations on matters related to the protection of life and property as affected by the emergency. The OES becomes the Emergency Operations Center from which all department heads direct and control emergency operations. Potential emergency situations requiring emergency services operations by OES include dam evacuation procedures, hazardous material incidents, nuclear power plant failure (Rancho Seco), flood evacuations and response, congregate care and mass casualty incidents. Specific contingency plans have been developed for each of these emergency situations. Other emergencies, such as earthquakes and plane crashes, would be managed by using the emergency organization established in the County Basic Emergency Response Plan.

3. PROGRAMS FOR EMERGENCIES

Flooding. The San Joaquin County Development Title requires evacuation plans for all mobilehome and trailer parks located in the floodway of the 100-year flood. The Development Title also requires evacuation plans from many of the mobilehome parks on the flood fringe of the 100-year flood. These evacuation plans require names of hauler or hauling company of mobilehomes, escape routes, storage areas of mobilehomes in flood free areas, criteria for implementation of evacuation plan and names of responsible persons. A staff member has been given responsibility of updating these plans yearly.

The State of California Dam Safety Act requires that dam owners submit inundation maps to the State Office of Emergency Services for those dams whose total failure would cause loss of life or personal injury. This law also requires local jurisdictions to adopt emergency procedures for the evacuation and control of populated areas below such dams.¹

The County OES has prepared a Dam Failure Plan. This Plan includes a description of dams, direction of flood waters, responsibilities and actions of individual jurisdictions, and evacuation plans.¹ In addition, OES has a flood evacuation plan for reclamation districts. Evacuation efforts should be toward State Routes 4 and 12 and Interstate 5 and then east to the collocation points (see Figure III.F-1).

In January 1984, the San Joaquin County Planning Division prepared a report titled "Report on Public Facilities Subject to Flooding in San Joaquin County".² The purpose of the report was to examine the safety of public facilities from flooding (100-year flood, 500-year flood, Dam failure inundation areas). The report evaluated certain types of public and quasi-public facilities and made findings and recommendations for use in future public facility planning and emergency planning.

Nuclear Power Plant Failure Ranch Seco, a nuclear power plant operated by the Sacramento Municipal Utility District (SMUD), is located approximately five miles north of San Joaquin County. Because of the potential radiation hazard to the surrounding area if there is a serious problem at the plant, emergency response plans have been prepared in Sacramento, Amador, and San Joaquin Counties.³ The three counties would coordinate in any emergency, working with SMUD and state and federal agencies.

Figure III.F-1 DELTA EVACUATION PLAN

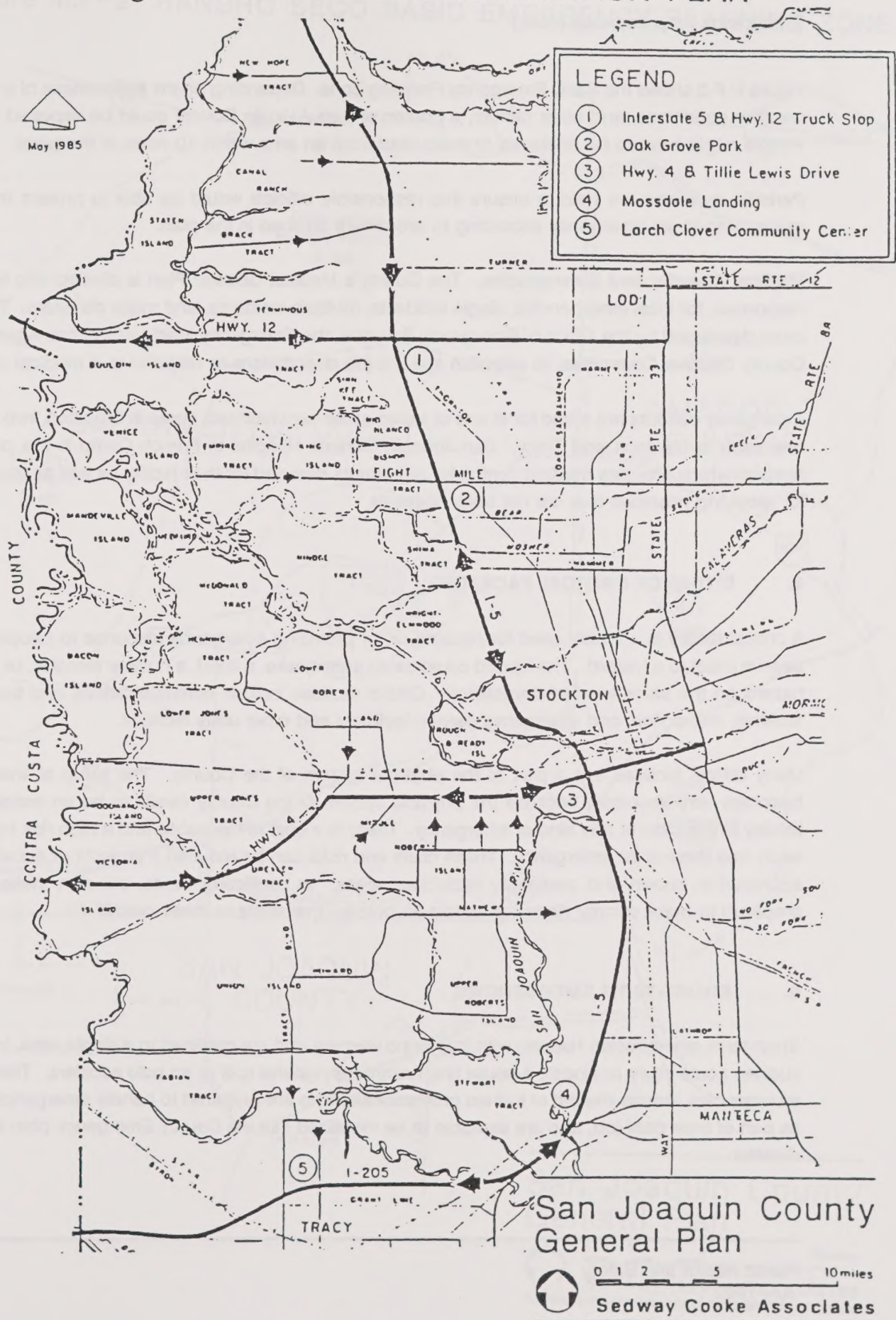


Figure III.F-2 shows the Basic Emergency Planning Zone. Depending on the seriousness of a plant failure, weather conditions, and other factors, a portion of San Joaquin County could be exposed to radiation. People might have to be sheltered or evacuated from an area within 10 miles of the plant.

Periodic exercises are held to ensure that responsible officials would be able to protect the public by responding in an emergency according to procedure outlined in the plan.

Medical Disaster and Emergencies. The County's Medical Disaster Plan is divided into four types of responses, for local emergencies, single incidents, multiple incidents, and major disasters. The plan has been developed by the Office of Emergency Services, the Emergency Medical Services Agency, and the County Disaster Committee, to establish specific job descriptions to respond to a medical disaster.

Emergency patients are cared for at one of seven acute care facilities: three in Stockton, two in Lodi, and one each in Manteca and Tracy. San Joaquin General Hospital in French Camp is the primary base hospital which provides medical control for all patients destined for their facility as well as those destined for receiving hospitals that are not base hospitals.

4. SITING OF CRITICAL FACILITIES

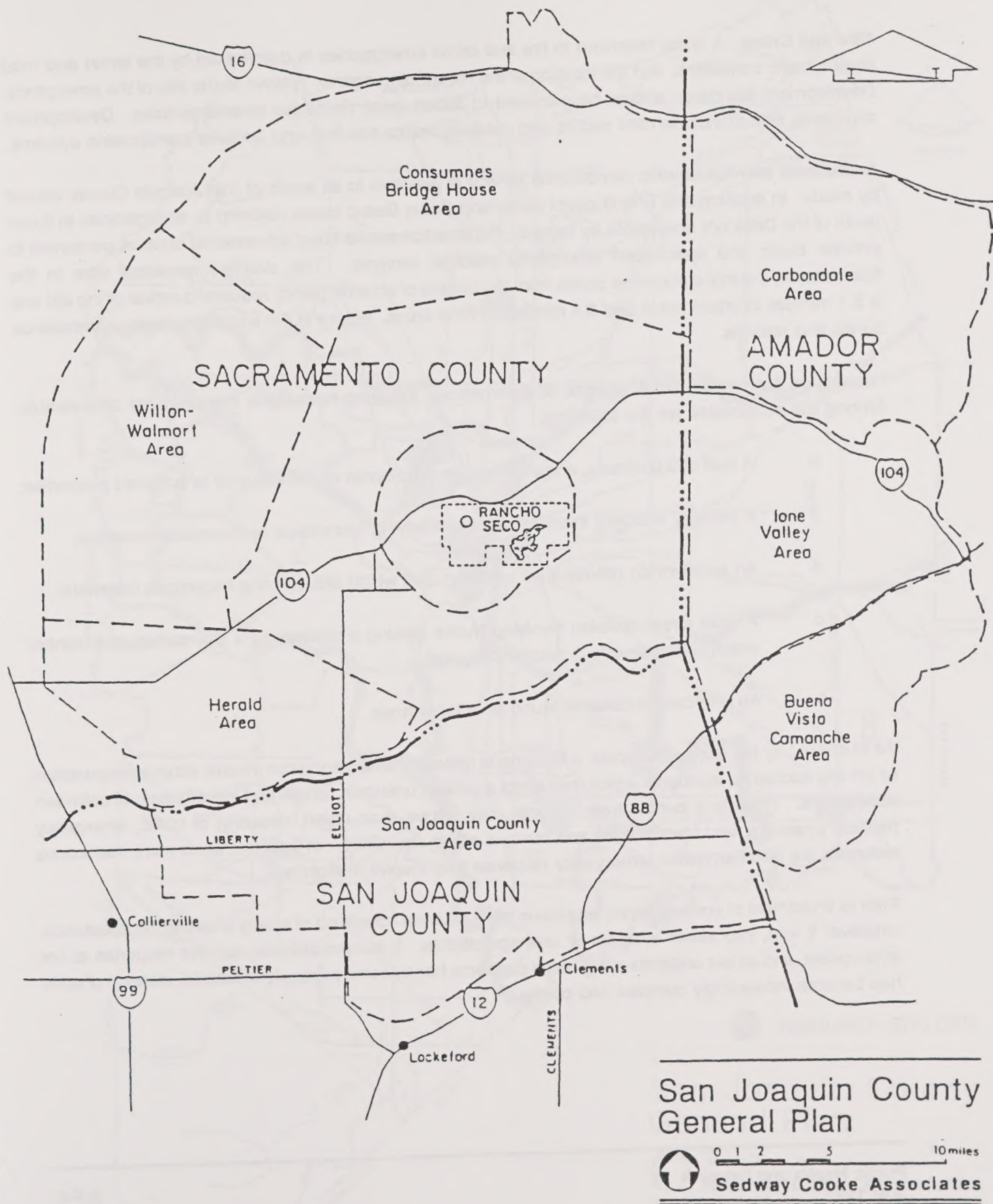
A critical facility is a facility used for housing or for providing emergency response to people who have been subject to a hazard. The hazard could be an earthquake, a flood, a nuclear disaster, or some other hazard on the same level of devastation. Critical facilities include communications and transportation facilities; fire, police, and emergency service facilities; and other utility facilities.

Many critical facilities are a part of the physical system of the County. The siting of these facilities becomes very important because the physical system of the County needs to be an asset and not a liability in the case of any kind of emergency. There is a cost to the public and a high risk to human life each time there is an emergency. These costs and risks can be reduced if projects or activities are not approved in known and potentially hazardous areas. In conflicting cases, decision makers must be prepared to make priority decisions based on policies that relate to these needs.

5. SHORT-TERM EMERGENCIES

Short-term emergencies happen with little or no warning and are confined to a single area, for example, sudden acute injury or illness, a house fire, hazardous material spill or an auto accident. These types of emergencies require the aid of trained professionals, who are prepared to handle emergency situations as part of their daily job, and are available to be mobilized into the County Emergency plan in case of a disaster.

Figure III.F-2 RANCHO SECO BASIC EMERGENCY PLANNING ZONE.



Fire and Crime. A quick response to fire and crime emergencies is determined by the street and road layout, traffic conditions, and the location of the responding agency relative to the site of the emergency. Development standards should be prepared to assert quick response to emergencies. Development standards should include road widths and roadway improvements, and address identification systems.

Ambulance and Paramedic. Ambulance service is available to all areas of San Joaquin County served by roads. In addition, the Sheriff patrol boats and Coast Guard boats respond to emergencies in those parts of the Delta not accessible by vehicle. Paramedics are certified advance life support personnel to provide basic and specialized emergency medical services. The average response time in the San Joaquin County ambulance zones from the receipt of an emergency request to arrival of the aid unit is 5.1 minutes in urban areas and 9.4 minutes in rural areas. Figure III.F-3 shows the various ambulance zones and stations.

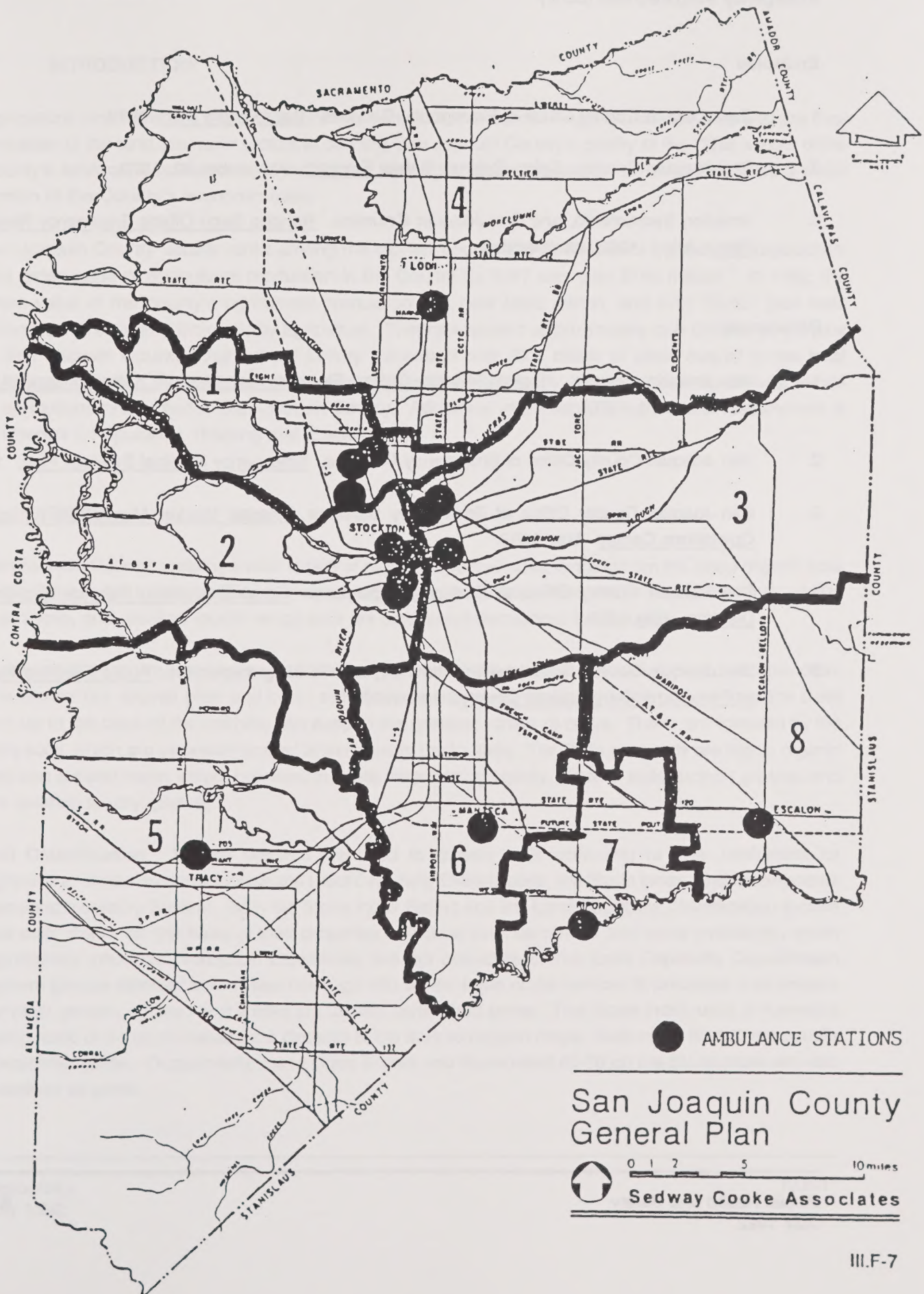
Hazardous Materials. Several types of emergencies involving hazardous materials are conceivable. Among the possibilities are the following:

- A spill at a business, endangering the employees of the site and/ or adjacent properties;
- A freeway accident involving vehicles carrying hazardous or flammable materials;
- An accident on railway lines involving cars which are carrying hazardous materials;
- A local street collision involving trucks making a delivery to a gas station or business which uses hazardous substances; and
- An unknown substance found on a local street.

As illustrated by the above examples, a hazardous materials emergency can involve either transportation or on-site accidents, accidents which may affect a wide or unknown range, and identification of unknown substances. Protecting people from hazards may involve evacuation, rerouting of traffic, emergency medical treatment, and identification and removal of the substance. In addition, since many hazardous materials are also flammable, emergency response may involve firefighting.

Prior to enactment of environmental protection laws, cleanup consisted of simply washing the substance, whatever it was, into sewer systems or drainage ditches. It is now obvious that this response is not appropriate, and as our understanding of the problems has become more sophisticated, cleanup of spills has become increasingly complex and costly.

Figure III.F-3 AMBULANCE STATIONS



Endnotes

1. San Joaquin County Office of Emergency Services. Dam Failure Plan. 1977.
2. San Joaquin County. Safety/Seismic Safety Element. November 30, 1978.
3. Amador, Sacramento, and San Joaquin Counties. Rancho Seco Offsite Emergency Response Plan. July 1, 1983, as amended.

References

1. San Joaquin County. Safety/Seismic Safety Element, San Joaquin County General Plan. November 30, 1978
2. San Joaquin County Office of Emergency Services. Emergency Medical Services Plan. 1985.
3. San Joaquin County Office of Emergency Services. Disaster Worker Manual for Emergency Operations Center. May 1985.
4. San Joaquin County Office of Emergency Services. Flood Evacuation Plan for Reclamation Districts. May 1985.
5. San Joaquin County Department of Planning and Building Inspection. Public Facilities Subject to Flooding in San Joaquin County. July 1983.

A. AGRICULTURAL LANDS

1. INTRODUCTION

Agricultural lands are one of the County's most important resources. Agricultural activities and the rural character of the land are major factors in defining San Joaquin County's quality of life. This aspect of the County's landscape is important to residents. Also agriculture and related activities represent a major portion of the County's economic base.

San Joaquin County usually ranks among the top ten counties in California for agricultural production. The gross value of agricultural production in the County for 1987 was over \$746 million.¹ In 1982, the gross value of the county's agricultural production was over \$693 million, and over 39,000 jobs were generated directly and indirectly by agriculture. This represented approximately one-third of all the jobs in San Joaquin County. Agricultural activity generated over \$3.6 billion of value overall in the local economy, including \$1.2 billion worth of personal income.² Tables IV.A-1, 2, and 3 indicate past trends in agricultural production in San Joaquin County. Additional information on agricultural employment is in Chapter I, Population, Housing and Employment.

2. SOILS

San Joaquin County contains a wide variety of highly productive soils, ranging from the deep organic soils of the Delta to the young alluvial soils occupying much of the Valley floor. Older alluvial benches, clayey basin soils, and residual foothill range soils are also found throughout the County.

Nearly all of the soil types found within the County are suitable for some form of agricultural production. The alluvial fan, alluvial plain and basin soils, found generally in the Valley bottom away from the Delta and up to the base of the foothills, can support the greatest variety of crops. These are followed by the terra soils, which are generally located at the base of the foothills. The Delta peat soils are highly organic and can support many crops; however, they are deteriorating rapidly. Foothill soils support grasses and are suitable for dry grazing.

Soil Classification. Several systems are used to classify soils according to their usefulness for agriculture. These systems include the Land Capability Classification, the Storie Index, and the Important Farmland Inventory System. Both the Storie Index Rating and the Land Capability Classification system rate soils strictly on the basis of their properties. Factors such as climate and water availability, which significantly influence production capabilities, are not considered. The Land Capability Classification System groups different soils (Class I through VIII) on the basis of the number of problems they present for plant growth. Class I and II soils are usually considered prime. The Storie Index uses a numerical rating scale of 0-100 to evaluate the capacity of the soils to support crops. Soils rated 80-100 are usually considered prime. Occasionally, some Class III soils and those rated 60-79 on the Storie Index are also classified as prime.

TABLE IV.A-1: TRENDS IN GROSS VALUE OF AGRICULTURAL PRODUCTION ¹

<u>Category</u>	<u>1960</u>	<u>1965</u>	<u>1970</u>	<u>1975</u>	<u>1980</u>	<u>1985</u>	<u>1987</u>
Field Crops	\$ 40.7	\$ 48.0	\$ 52.6	\$138.9	\$190.1	\$158.0	\$133.0
Vegetable Crops	45.9	60.9	51.3	99.1	107.3	118.9	113.8
Fruit/Nut Crops	49.4	57.3	63.3	108.3	217.3	176.1	247.1
Seed Crops	2.9	5.9	3.9	8.0	6.4	6.5	6.3
Nursery Products	1.7	2.6	2.0	10.5	17.5	17.1	23.8
Livestock/Poultry	19.8	16.2	15.8	22.2	63.2	36.6	45.0
Livestock/Poultry Products	22.9	33.0	51.2	92.8	157.7	184.3	175.3
Apiary Products	.2	.2	.2	.6	1.4	1.9	1.8
Total	\$183.5	\$224.1	\$240.3	\$280.4	\$760.9	\$699.4	\$746.1

¹ In millions of dollars.

Source: San Joaquin County Department of Agriculture, Agricultural Reports.

TABLE IV.A-2: TRENDS IN ACREAGE OF AGRICULTURAL PRODUCTION ¹

<u>Crop</u>	<u>1960</u>	<u>1965</u>	<u>1970</u>	<u>1975</u>	<u>1980</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
Field	615,250	646,164	630,401	674,832	556,000	482,000	463,000	446,000
Fruit & Nut	90,345	102,276	106,431	114,541	125,648	132,000	130,000	125,000
Vegetable	104,313	89,822	76,904	76,798	57,097	63,600	59,300	60,000
Seed	NA	NA	14,272	13,269	9,427	8,510	6,850	7,630
Total	809,908	838,262	828,008	879,540	748,172	686,110	659,150	638,630

¹ Acreage harvested.

NA Not available.

Source: San Joaquin County Department of Agriculture, Agricultural Reports.

TABLE IV.A-3: SAN JOAQUIN COUNTY'S TEN LEADING CROPS

<u>Crop</u>	<u>1987 Value</u>	<u>1986 Rank</u>	<u>1985 Rank</u>	<u>1984 Rank</u>	<u>1983 Rank</u>	<u>1972 Rank</u>
Milk	\$135,846,000	1	1	1	1	1
Grapes	65,129,000	2	2	2	2	2
Almonds (meats)	60,849,000	8	6	5	12	9
Cherries	54,809,000	13	7	7	11	11
Tomatoes	52,658,000	3	3	3	3	3
Walnuts	40,885,000	9	11	12	10	6
Eggs	38,220,000	4	4	4	4	5
Cattle & Calves	36,636,000	5	9	10	6	4
Sugar Beets	34,059,000	10	12	9	7	12
Hay	31,550,000	6	5	8	5	8
Total	\$550,641,000					

Source: San Joaquin County Department of Agriculture, 1987 Agricultural Report.

A more recent classification system, the Important Farmland Inventory System, classifies land based upon ten soil and climatic characteristics. This system was initiated in 1975 by the United States Department of Agriculture Soil Conservation Service (SCS) as part of a program to map the nation's farmlands.

In 1980 the California Department of Conservation began the Farmland Mapping and Monitoring Program to supplement the SCS program. Initial State efforts were directed primarily at providing financial assistance and limited staff support to expedite completion of the maps by SCS. The State's involvement in the SCS program and continued controversy over agricultural land conversions led to the passage of State legislation to inventory the State's crop and grazing lands and set up a monitoring system to document how much land was coming into or going out of agricultural production each year in California. SCS has completed its soil survey of San Joaquin County. At this time it is not in a format which is usable on a countywide basis. It does, however, provide site specific information which is useful during the review of projects.

The Important Farmland Series maps classify land as follows:³

1. Prime Farmland - Land which has the best combination of features for the production of agricultural crops.
2. Farmland of Statewide Importance - Land other than Prime Farmland that has a good combination of physical and chemical features for the production of agricultural crops.
3. Unique Farmland - Land of lesser quality soils which are used for the production of the State's leading agricultural cash crops.
4. Farmlands of Local Importance - Land which is of importance to the local agricultural economy.
5. Grazing Land - Land on which existing vegetation is suited to the grazing of livestock.
6. Urban and Built Up Lands - Land occupied by structures with a building density of at least one unit to one and one-half acres.
7. Other Lands - Land which does not meet the criteria of any other category.
8. Land Committed to Non-agricultural Use - This includes vacant areas and existing farm and grazing land which have a permanent commitment to development.

Local jurisdictions participate in the mapping program by identifying Farmlands of Local Importance and by reporting annually on conversions of lands to or from agriculture. Once it is completed, the County will utilize this system to guide its decisions affecting agricultural land. Until that time, it will continue to use the existing Land Capability Classification system (see Figure IV.A-1).

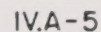
3. WATER USE

Agriculture is the largest consumptive water user in the State. This fact becomes critically important in the San Joaquin Valley, where annual rainfall is low and the need for large quantities of water is great. As discussed in the Water Quality Appendix, groundwater levels have fallen dramatically.

Agricultural runoff can also adversely affect water quality downstream, the Delta, and San Francisco Bay. Thus, it is important for the County to encourage conservation of scarce water while working to improve the quality of runoff water.

Additional information regarding agricultural water use is in Chapter IV. E, the Water Resources and Quality chapter.

Source: U.S. Census Bureau, Current Population Reports, 1990, 1995, 2000, 2005, 2010, 2015, 2020, 2025, 2030, 2035, 2040, 2045, 2050, 2055, 2060, 2065, 2070, 2075, 2080, 2085, 2090, 2095, 2100, 2105, 2110, 2115, 2120, 2125, 2130, 2135, 2140, 2145, 2150, 2155, 2160, 2165, 2170, 2175, 2180, 2185, 2190, 2195, 2200, 2205, 2210, 2215, 2220, 2225, 2230, 2235, 2240, 2245, 2250, 2255, 2260, 2265, 2270, 2275, 2280, 2285, 2290, 2295, 2300, 2305, 2310, 2315, 2320, 2325, 2330, 2335, 2340, 2345, 2350, 2355, 2360, 2365, 2370, 2375, 2380, 2385, 2390, 2395, 2400, 2405, 2410, 2415, 2420, 2425, 2430, 2435, 2440, 2445, 2450, 2455, 2460, 2465, 2470, 2475, 2480, 2485, 2490, 2495, 2500, 2505, 2510, 2515, 2520, 2525, 2530, 2535, 2540, 2545, 2550, 2555, 2560, 2565, 2570, 2575, 2580, 2585, 2590, 2595, 2600, 2605, 2610, 2615, 2620, 2625, 2630, 2635, 2640, 2645, 2650, 2655, 2660, 2665, 2670, 2675, 2680, 2685, 2690, 2695, 2700, 2705, 2710, 2715, 2720, 2725, 2730, 2735, 2740, 2745, 2750, 2755, 2760, 2765, 2770, 2775, 2780, 2785, 2790, 2795, 2800, 2805, 2810, 2815, 2820, 2825, 2830, 2835, 2840, 2845, 2850, 2855, 2860, 2865, 2870, 2875, 2880, 2885, 2890, 2895, 2900, 2905, 2910, 2915, 2920, 2925, 2930, 2935, 2940, 2945, 2950, 2955, 2960, 2965, 2970, 2975, 2980, 2985, 2990, 2995, 3000, 3005, 3010, 3015, 3020, 3025, 3030, 3035, 3040, 3045, 3050, 3055, 3060, 3065, 3070, 3075, 3080, 3085, 3090, 3095, 3100, 3105, 3110, 3115, 3120, 3125, 3130, 3135, 3140, 3145, 3150, 3155, 3160, 3165, 3170, 3175, 3180, 3185, 3190, 3195, 3200, 3205, 3210, 3215, 3220, 3225, 3230, 3235, 3240, 3245, 3250, 3255, 3260, 3265, 3270, 3275, 3280, 3285, 3290, 3295, 3300, 3305, 3310, 3315, 3320, 3325, 3330, 3335, 3340, 3345, 3350, 3355, 3360, 3365, 3370, 3375, 3380, 3385, 3390, 3395, 3400, 3405, 3410, 3415, 3420, 3425, 3430, 3435, 3440, 3445, 3450, 3455, 3460, 3465, 3470, 3475, 3480, 3485, 3490, 3495, 3500, 3505, 3510, 3515, 3520, 3525, 3530, 3535, 3540, 3545, 3550, 3555, 3560, 3565, 3570, 3575, 3580, 3585, 3590, 3595, 3600, 3605, 3610, 3615, 3620, 3625, 3630, 3635, 3640, 3645, 3650, 3655, 3660, 3665, 3670, 3675, 3680, 3685, 3690, 3695, 3700, 3705, 3710, 3715, 3720, 3725, 3730, 3735, 3740, 3745, 3750, 3755, 3760, 3765, 3770, 3775, 3780, 3785, 3790, 3795, 3800, 3805, 3810, 3815, 3820, 3825, 3830, 3835, 3840, 3845, 3850, 3855, 3860, 3865, 3870, 3875, 3880, 3885, 3890, 3895, 3900, 3905, 3910, 3915, 3920, 3925, 3930, 3935, 3940, 3945, 3950, 3955, 3960, 3965, 3970, 3975, 3980, 3985, 3990, 3995, 4000, 4005, 4010, 4015, 4020, 4025, 4030, 4035, 4040, 4045, 4050, 4055, 4060, 4065, 4070, 4075, 4080, 4085, 4090, 4095, 4100, 4105, 4110, 4115, 4120, 4125, 4130, 4135, 4140, 4145, 4150, 4155, 4160, 4165, 4170, 4175, 4180, 4185, 4190, 4195, 4200, 4205, 4210, 4215, 4220, 4225, 4230, 4235, 4240, 4245, 4250, 4255, 4260, 4265, 4270, 4275, 4280, 4285, 4290, 4295, 4300, 4305, 4310, 4315, 4320, 4325, 4330, 4335, 4340, 4345, 4350, 4355, 4360, 4365, 4370, 4375, 4380, 4385, 4390, 4395, 4400, 4405, 4410, 4415, 4420, 4425, 4430, 4435, 4440, 4445, 4450, 4455, 4460, 4465, 4470, 4475, 4480, 4485, 4490, 4495, 4500, 4505, 4510, 4515, 4520, 4525, 4530, 4535, 4540, 4545, 4550, 4555, 4560, 4565, 4570, 4575, 4580, 4585, 4590, 4595, 4600, 4605, 4610, 4615, 4620, 4625, 4630, 4635, 4640, 4645, 4650, 4655, 4660, 4665, 4670, 4675, 4680, 4685, 4690, 4695, 4700, 4705, 4710, 4715, 4720, 4725, 4730, 4735, 4740, 4745, 4750, 4755, 4760, 4765, 4770, 4775, 4780, 4785, 4790, 4795, 4800, 4805, 4810, 4815, 4820, 4825, 4830, 4835, 4840, 4845, 4850, 4855, 4860, 4865, 4870, 4875, 4880, 4885, 4890, 4895, 4900, 4905, 4910, 4915, 4920, 4925, 4930, 4935, 4940, 4945, 4950, 4955, 4960, 4965, 4970, 4975, 4980, 4985, 4990, 4995, 5000, 5005, 5010, 5015, 5020, 5025, 5030, 5035, 5040, 5045, 5050, 5055, 5060, 5065, 5070, 5075, 5080, 5085, 5090, 5095, 5100, 5105, 5110, 5115, 5120, 5125, 5130, 5135, 5140, 5145, 5150, 5155, 5160, 5165, 5170, 5175, 5180, 5185, 5190, 5195, 5200, 5205, 5210, 5215, 5220, 5225, 5230, 5235, 5240, 5245, 5250, 5255, 5260, 5265, 5270, 5275, 5280, 5285, 5290, 5295, 5300, 5305, 5310, 5315, 5320, 5325, 5330, 5335, 5340, 5345, 5350, 5355, 5360, 5365, 5370, 5375, 5380, 5385, 5



4. DIVISIONS OF LAND

An analysis of parcel maps which have been approved in areas zoned for Agriculture revealed that 851 new parcels were created from 628 existing parcels during fiscal years 1977-1983 (since the time of the adoption of the preceding general plan). Distribution by parcel size of the 1,479 parcels that resulted from these divisions (i.e., the 851 new parcels plus the 628 existing parcels) is shown in Table IV.A-4.

TABLE IV.A-4: DIVISIONS OF LAND IN AGRICULTURAL AREAS 1977-1983

<u>Parcel Size</u>	<u>Number of Parcels</u>
0 - 3 acres	482
3.1 - 9.9 acres	137
10 - 19.9 acres	180
20 - 39.9 acres	278
40+ acres	402
Total	1,479

Source: San Joaquin County Community Development Department

Of the 1,479 parcels, over half (799) are smaller than 20 acres in size. Many of these parcels are too small to accommodate most commercial agricultural operations. Parcels which are no longer used for agriculture may affect the agricultural operations on adjoining properties. Furthermore, they are an inefficient use of land for residential development. For example, in an urban area where services are available, three acres could accommodate twelve or more residences. In an agricultural area it may accommodate only one residence. Thus, excessive parcel division can undermine efforts to promote efficient use of both agricultural and non-agricultural lands, and it can threaten the County's economic base as well.

The California Farmlands Project identifies parcel subdivisions as one of the biggest threats to California agriculture.⁴ From a commercial perspective, smaller parcels are inefficient and thus not competitive. Costs of operations and support services may increase, which leads to further pressure to sell or subdivide. Leapfrog urban development may result, particularly if utilities are extended. Once started,

the process tends to repeat itself, magnifying the problems, ultimately threatening agricultural lands over an ever-increasing area.

In some areas of San Joaquin County, past divisions have created parcels 5 - 10 acres in size within the agricultural areas. Generally, these areas are used for small-scale agricultural operations, "hobby" farming, or rural residences. They are almost totally removed from commercial agricultural uses, thereby making it difficult to apply policies aimed at preserving commercial operations in these areas. These areas generally have higher density residential development than most agricultural areas; therefore, additional protection is required from agricultural operations which are incompatible with residential development.⁵

Also located throughout the agricultural areas of San Joaquin County are antiquated subdivisions. These are subdivisions which are undeveloped or only partially developed and which could not be approved now because of more stringent or different planning, zoning, and subdivision regulations.

Many of the antiquated subdivisions in the agricultural areas of the County were created in the first three decades of the century. They were created and recorded in compliance with the laws at that time. Many were never developed because of their remote location. Many of these subdivisions are invisible to the eye, since they were purchased as a single piece by farmers who have farmed them as a single unit.

In recent years, people have become aware of these antiquated subdivisions. There is concern about their development because of the small sizes of the lots and the creation of what would essentially be residential areas in the midst of the agricultural areas. The development of the antiquated subdivisions circumvents the goals and policies of the County's General Plan, particularly with respect to the preservation and protection of agriculture. Other consequences of development of the antiquated subdivisions are similar to those problems identified above, and also include:

1. Potential adverse impact on county services -- police and fire protection services, and health services.
2. Potential adverse impact on rural roads.
3. Potential adverse environmental impacts on rare and endangered species and their habitat.
4. Potential adverse impacts on surrounding agricultural operations.
5. Potential adverse impacts on ground water.
6. Potential adverse impacts on school facilities.

At the present time, building permits for lots in antiquated subdivisions are approved, provided such lots have frontage on or approved access to a county maintained road and meet health and safety requirements for infrastructure.

The impacts created by development of the antiquated subdivisions could be significant. In 1987, there were almost 4,600 undeveloped lots in antiquated subdivisions in the unincorporated area. Over half of those lots were in the five- to ten-acre range. A smaller portion, roughly one in seven, were less than five acres in size.

5. URBAN LAND USE CONFLICTS

Because of the pattern of historical settlement in San Joaquin County, most of the existing urban communities are located on and surrounded by highly productive soils. Thus, urban expansion, even if contiguous to existing development, will result in the reduction of land which is suitable for agriculture. In addition, past growth policies have permitted scattered urban development which has had an even larger impact on agriculture and has consumed more land than contiguous development would have.⁵

The introduction of some types of non-farm uses into agricultural areas can create conflicts between the agricultural operation and the non-farm uses. The problems can become acute for residential development. Normal agricultural operations generate dust, noise, and often, unpleasant odors. More severe, long-term conflicts may occur over the usage of water for agriculture versus urban development, the potential of water pollution from the application of pesticides and fertilizer, and even over the use of the roads.⁶ Farmers often become targets for nuisance suits.

The nuisances are mutual. Farmers may experience vandalism, theft of equipment and crops, dumping of trash, and trespassing. People not engaged in commercial agriculture often do not manage their agricultural operations as well as those who are. Less healthy crops may result in more pests, creating the need for more pesticide use on surrounding farms.⁵

These conflicts cannot generally be prevented if agriculture and non-agricultural uses try to coexist in one area. Therefore, these uses should be separated as much as is feasible, allowing the agricultural industry to operate as efficiently as possible and decreasing the opportunity for conflicts. In general, agricultural land uses should be preserved by allowing those uses for as long as possible, until the need for additional urban land is demonstrated.

Despite the problems described above, it is recognized that there are some uses which require locations in agricultural areas, either because they are providing a support service to the surrounding agricultural operations, because of their resource orientation, or because of their operational characteristics.

6. AIR POLLUTION

Significant crop damage from air pollution in San Joaquin was reported as early as 1960. In that year, pollution caused an estimated \$24,000 loss to a lettuce crop in the Tracy area.⁷ In 1982, it was estimated that statewide, agriculture may be losing from \$150 million to \$1 billion a year to smog.⁸

Air pollution affects crops by interfering with photosynthesis. This causes damage to leaves. Smog also reduces yield, carbohydrate content, and the weight of plants and crops, reducing their market value, food content and aesthetic appeal. The plants are killed or weakened, and some vegetation then becomes more vulnerable to disease and insect damage as well. Many of the leading crops of San Joaquin County have been found to be susceptible to pollution. These crops include grapes, tomatoes, alfalfa, and sugar beets.⁹

Some agricultural practices also contribute to air pollution. Examples include the dust created from some operations, particulates emitted from agricultural burning, pesticide applications, and emissions from the use of farm machinery. Methods to reduce pollution from several of these sources are identified in the San Joaquin County 1982 Air Quality Management Plan.

7. PRESERVATION OF AGRICULTURAL LAND

The County presently has two major programs for preserving agricultural lands--the Williamson Act and the General Plan/Planning Code.

The Williamson Act. The California Land Conservation Act of 1965, as amended, commonly known as the Williamson Act, is a voluntary tax incentive program for preserving agricultural and open space lands. A ten-year contract is entered into by the County and the property owner. The contract is renewed automatically each year unless it is canceled or one party gives notice of non-renewal. The County places restrictions on the use of the land and is thereby guaranteed that the property will remain in an agricultural or open space use. The property owner is guaranteed that the property will be taxed according to the income it is capable of generating from agriculture and other compatible uses, rather than its full market value. As of June 1984, approximately 540,000 acres, or 71% of the land used for agriculture in San Joaquin County, was held under Williamson Act contracts.

Property may be removed from a Williamson Act contract by two methods. First a notice of non-renewal may be filed. At the end of the 10-year contract, the property will then be out of the contract. The second method is by applying for a cancellation of the Williamson Act Contract. In order for the Board of Supervisors to approve a cancellation request, they must make either finding (a) or finding (b) below:

- (a) The cancellation is consistent with the purposes of the Williamson Act because:

- (1) The cancellation is for land on which a Notice of Nonrenewal has been served pursuant to Section 51245 of the Government Code.
 - (2) The cancellation is not likely to result in the removal of adjacent lands from agricultural use.
 - (3) The cancellation is for an alternative use which is consistent with the applicable provisions of the County General Plan.
 - (4) The cancellation will not result in discontinuous patterns of urban development.
 - (5) There is no proximate noncontracted land which is both available and suitable for the use to which it is proposed the contracted land be put, or, development of the contracted land would provide more contiguous patterns of urban development than development of proximate noncontracted land.
- (b) The cancellation is in the public interest because:
- (1) Other public concerns substantially outweigh the objectives of the Williamson Act.
 - (2) There is no proximate noncontracted land which is both available and suitable for the use to which it is proposed the contract land be put, or, development of the contracted land would provide more contiguous patterns of urban development than development of proximate noncontracted land.

In order to be eligible for tax benefits under the Williamson Act, the land must be located within an agricultural reserve designated by the County. Counties which participate in the Williamson Act program receive subventions from the State to offset the losses in tax revenue incurred from the placement of lands under contract. San Joaquin County received over a million dollars in subventions in 1983.¹⁰

Since Proposition 13 was passed in 1978, the adequacy of the tax incentive provided by the Williamson Act has been questioned. In 1983, a survey¹¹ conducted by the California Department of Conservation of nineteen counties participating in the Williamson Act program concluded that "although the Williamson Act tax incentive has been reduced by about 20% since passage of Proposition 13, the Act continues to offer considerable property tax advantages for owners of contracted agricultural lands." Another finding of the survey was that of all land use types under Williamson Act contract, dry grazing land receives the largest reductions in property taxes. On an average, dry grazing receives a tax reduction of 90% of the Proposition 13 value while land uses such as orchards and vineyards receive a 37 and 31% reduction, respectively.

General Plan/Development Title. The purpose of the General Plan is to serve as a guide for the comprehensive long-range development of the County. The Development Title, consisting of the zoning

and subdivision ordinances, regulates, among other things, land uses and parcel sizes in the County. This document can help preserve agricultural land by retaining agricultural land in economically viable parcel sizes, by prohibiting scattered non-agricultural uses, and by allowing urban development only adjacent to existing communities.

Density Standards. The General Plan also establishes population densities and building intensities for the Agricultural land use designations. Commercial farmlands operate efficiently with very large parcels. While the minimum parcel size for most operations must be at least 80 to 160 acres to assure economic viability, for some crops parcels as small as 20 to 40 acres may still be viable, particularly if water is available for irrigation. Residential uses on land suitable for commercial agriculture should be limited to no more than one dwelling unit per 20 acres.

While the number of smaller parcels supporting small-scale or part-time operations clearly should not be increased if the County's agricultural economy is to be protected, existing small-scale operations should be allowed to continue. Minimum parcel sizes for these operations can be much smaller; generally 5 - 10 acres is acceptable. Likewise, residential densities in these areas can be slightly higher--up to one dwelling unit per five acres.

Agriculture-Urban Preservation. Once some urban development has occurred in an agricultural area and many small parcels have been created under different ownerships, it may be difficult to coordinate a rational overall development plan. Furthermore, the provision of services such as water, sewer, and drainage systems and the construction of adequate roads become more difficult and costly than in urban areas, because these services must be extended great distances to serve fewer homes. In order to prevent unplanned or leapfrog development patterns, widespread urban development should not be permitted in agricultural areas adjacent to existing urban areas or within a city's planned growth area until the need for additional urban land is clearly demonstrated and adequate provisions have been made for public services.

On the other hand, large capital investments in agricultural operations may be inappropriate in these areas, since they eventually will become part of an urbanized area. Allowing a full range of agricultural activities to continue for as long as possible in a future urban area is a highly desirable though difficult task. Retaining the area in large parcels with uses limited primarily to agricultural production will facilitate orderly urban development in the future.

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B. EXTRACTIVE RESOURCES

1. INTRODUCTION

Resource extraction is the removal of natural resources from their place of discovery. The primary extractive resources in San Joaquin County are sand, gravel, and natural gas. Peat soil, placer gold and silver are also extracted from the County to a lesser extent. Other resources which have been extracted in the past include coal, clay, and manganese ore, all of which have been mined in the southwestern portion of the County. Extractive resources are considered non-renewable resources, since it can take from decades to thousands of years for the resource supply to be replenished by nature.

2. SAND AND GRAVEL

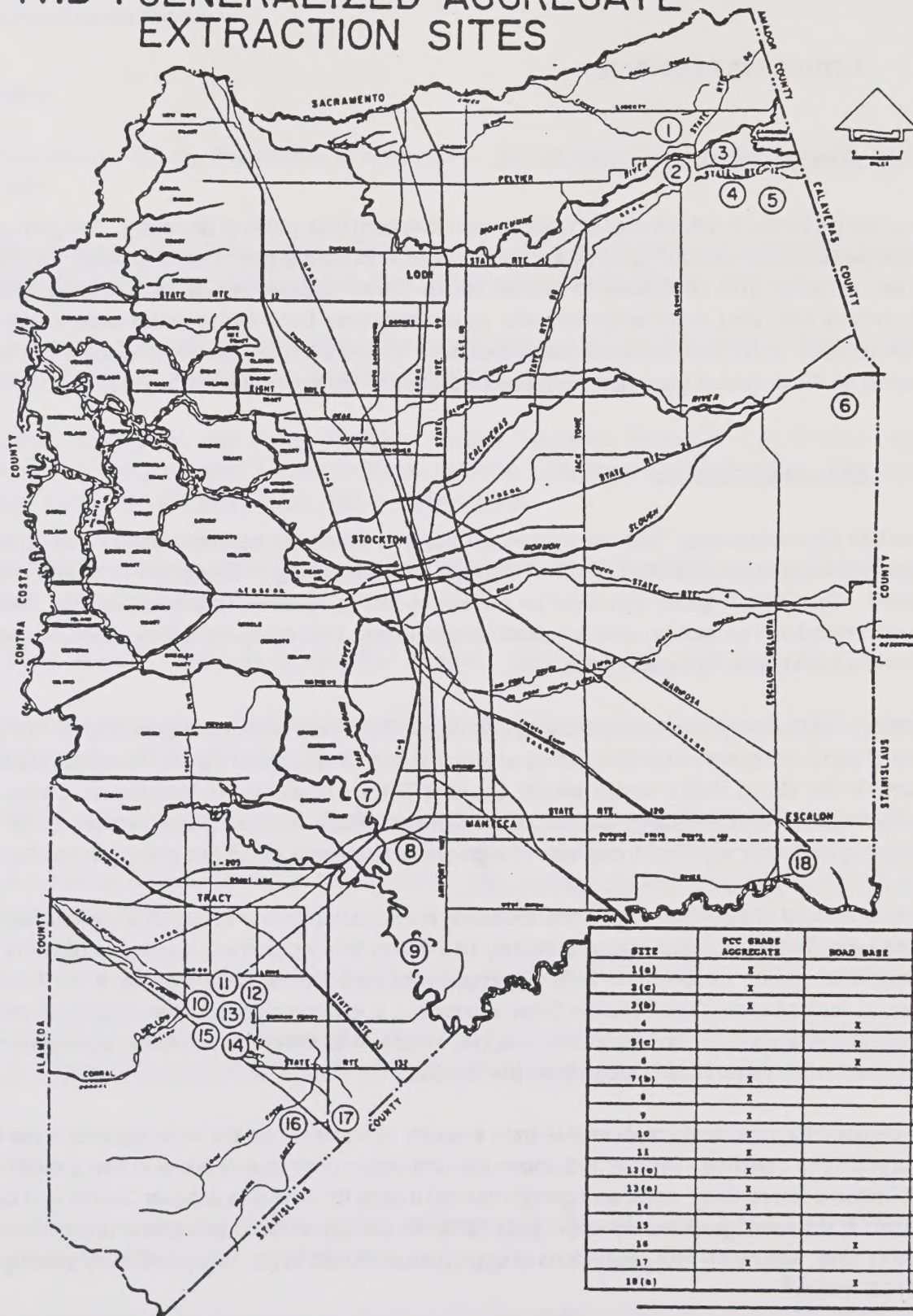
Land Use Characteristics. Sand and gravel extraction is usually an isolated activity involving large land areas and large-scale alteration of the landscape, often resulting in disruption of plants and animal habitats. The State requires that sites be reclaimed—that is, returned to productive use. Most of the County's reclaimed excavation sites are used for agriculture. One exception is Oakwood Lake, which has become a commercial recreation area.

Location and Quantity. Known sand and gravel deposit areas are shown on Figure IV.B-1. The principal areas of sand and gravel extraction activity in San Joaquin County are in the southwestern portion of the County in the Corral Hollow Creek alluvial fan near Tracy and along the Mokelumne, Calaveras, and Stanislaus Rivers in the eastern portion of the County. There are four areas, referred to as sectors, containing regionally significant deposits of high-grade aggregate (sand and gravel) in the County.

The total amount of aggregate resources, excluding the sand deposits in Sector D, is approximately 584.2 million tons. There are a total of approximately 78.9 million tons within these aggregate deposits that are permitted for mining (reserves).¹ Total aggregate resources for the sectors are listed in Table IV.B-1. Sector A, located in the Corral Hollow Creek alluvial fan, is the major construction aggregate production district in the County. Over 80 percent, approximately 482 million tons, of the aggregate material consumed in the region is produced from this deposit.

The demand for sand and gravel comes from a variety of markets, but the most significant markets are for asphalt and concrete. Table IV.B-2 shows the production of sand and gravel in San Joaquin County and California since 1972. Sand and gravel reached a peak for both San Joaquin County and California in terms of the tonnage extracted in the year 1979. Production of sand and gravel reached its highest value in 1986, with nearly four million tons of aggregate produced in San Joaquin County yielding a value of \$15.6 million.²

Figure IV.B-1 GENERALIZED AGGREGATE EXTRACTION SITES



SITE	PCC GRADE AGGREGATE	ROAD BASE	SJC* PERMIT NO.
1 (a)	X		QX-84-3
2 (c)	X		QX-90-1
3 (b)	X		Q1-84-4
4		X	QX-88-1
5 (c)		X	QX-91-4
6		X	QX-91-6
7 (b)	X		QX-88-9
8	X		EP-83-1
9	X		QX-89-3
10	X		QX-88-4
11	X		EP-84-10
12 (a)	X		QX-91-2
13 (a)	X		EP-88-1
14	X		QX-89-1
15	X		QX-89-1
16		X	QX-88-2
17	X		QX-88-3
18 (a)		X	QX-89-2

- * San Joaquin County
- (a) Reserves below minimum threshold value, classified MRE-3
- (b) Temporarily not in production as of October 1991
- (c) Now operation, not in commercial production as of October 1991

Sources: State Mining and Geology Board, California Department of Conservation, August 1988; San Joaquin County Department of Planning and Building Inspection.

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Potential Hazards. The extraction of sand and gravel can result in several problems and hazards. First, the resources may be located in the same vicinity as other land uses that make it difficult or impossible to excavate the resource when it is needed. Secondly, conflicts often arise in determining the "best" use of the land. For example, sand and gravel deposits are often located in prime agricultural areas, in sensitive plant or animal habitats, or in recreational areas. The extraction activities can disrupt or eliminate these amenities. Mining is often characterized by noise, dust, vibrations, and visual blight which make them undesirable neighbors. Finally, inadequate reclamation efforts after the sites are closed can leave the landscape pitted and scarred. To help alleviate some of these adverse impacts and to insure proper reclamation of mined sites, the County exercises regulatory/enforcement authority, as described below.

TABLE IV.B-1: TOTAL AGGREGATE RESOURCES FOR SECTORS A, B, C, AND D

<u>Sector</u>	<u>Total Acres</u>	<u>Acres Permitted</u>	<u>Reserves (tons)¹</u>	<u>Resources (tons)</u>
A	2,834	820		481,900,000
B	1,237	0		64,600,000
C	879	38		37,700,000
Subtotal	4,950	858	78,900,000	584,200,000
D (sand only)	884	161		90,200,000
Grand Total	5,834	1,019	78,900,000	674,400,000

¹ Breakdown by sector not available.

Source: California Department of Conservation, Division of Mines and Geology, Special Report 160, 1988.

Regulations and Controls. In 1975 the California State legislature enacted the Surface Mining and Reclamation Act (SMARA) to ensure that:

- Adverse environmental effects are prevented or minimized and that mined lands are reclaimed to a usable condition which is readily adaptable for alternative land uses.
 - The production and conservation of minerals are encouraged, while giving consideration to values relating to recreation, watershed, wildlife, range and forage, and aesthetic enjoyment.
 - Residual hazards to the public health and safety are eliminated.³
-

TABLE IV.B-2
PRODUCTION OF SAND AND GRAVEL IN SAN JOAQUIN COUNTY AND IN CALIFORNIA

<u>Year</u>	<u>SAN JOAQUIN COUNTY</u>		<u>CALIFORNIA</u>	
	<u>Quantity (tons)</u>	<u>Value</u>	<u>Quantity (tons)</u>	<u>Value</u>
1972	2,360,000	\$ 3,033,000	117,288,000	\$162,619,000
1973	2,083,000	3,403,000	117,470,000	176,286,000
1974	2,794,000	5,624,000	105,191,000	176,213,000
1975	1,908,000	4,384,000	88,445,000	168,248,000
1976	2,751,000	6,615,000	95,592,000	202,272,000
1977	3,231,000	8,608,000	109,135,000	250,951,000
1978	3,300,000	9,325,000	115,100,000	281,400,000
1979	3,927,000	11,893,000	129,348,000	347,385,000
1980	3,479,000	11,395,000	116,426,000	381,005,000
1981*	Not Available	Not Available	107,200,000	352,100,000
1982	1,841,754	6,967,116	81,147,000	270,995,000
1984	2,759,369	10,681,165	102,419,611	360,427,052
1986	3,735,155	15,577,097	128,406,902	498,455,690

* Because of a change in the Department of the Interior's data canvassing procedures in 1981, no County sand and gravel data will be available for odd-numbered years.

Source: U. S. Department of the Interior, Bureau of Mines, Reno, Nevada

The SMARA also requires that the State Geologist identify and classify mineral areas in the State and that the State Mines and Geology Board designate mineral deposits of regional or statewide significance. These areas are to be classified as one of four Mineral Resource Zones (MRZ) or as a Scientific Zone, as described in Table IV.B-3. After the mineral classification information is received, mineral resource management policies must be incorporated into the General Plans of cities and counties. These policies are to support mining operations, including dredging and quarrying, and are intended to ensure that mineral resources will be available when their development is necessary or economically feasible. The mineral deposits in San Joaquin County have been identified and classified by the State Geologist in Special Report 160, issued August 1988. Figure IV.B-1 identifies aggregate extraction sites available for

commercial use in the County. Regionally significant and potentially significant construction resource areas (sand and gravel) MRZ-2 and MRZ-3 areas are identified in Figure IV.B-2.

TABLE IV.B-3: MINERAL RESOURCE AND SCIENTIFIC ZONES

MRZ-1:	Areas where adequate information indicates that no significant mineral deposits are present or where it is judged that little likelihood exists for their presence.
MRZ-2:	Areas where adequate information indicates that significant mineral deposits are present or where it is judged that a high likelihood for their presence exists.
MRZ-3;	Areas containing mineral deposits the significance of which cannot be evaluated from available data.
MRZ-4:	Areas where available information is inadequate for assignment to any other MRZ zone.
SZ:	Areas containing unique or rare occurrences of rocks, minerals, or fossils that are of outstanding scientific significance shall be classified in this zone.*

* No such areas are known to exist in San Joaquin County.

Source: Guidelines, Title 14, California Administrative Code, Chapter 8, Subchapter 1, Article II, Section (2).

Future of the Industry. According to the State Mines and Geology report, the County will need 281 million tons of aggregate during the next 50 years, based on the current per capita aggregate consumption rate of 8.5 tons per year and Department of Finance population projections. Of this projected demand, approximately 40% (113 million tons) must be high-grade aggregate. The largest supplies of sand and gravel in the County are the Corral Hollow area near Tracy. The 79 million tons of aggregate reserves calculated to exist within this region represent 28% of the projected demand for all aggregate over the next 50 years. Unless new resources are permitted for mining, or alternative resources are utilized, existing reserves will be depleted by the year 2004. If a major earthquake, or similar unforeseen catastrophic event strikes the region and necessitates reconstruction, existing reserves would be depleted sooner.⁷ The deposits could last for longer than projected if excavators are granted variances permitting excavations below 90 feet; however, such excavations would reach the groundwater table.⁸

Without adequate planning and protection of future sources of aggregate in this region, it may be necessary to seek alternative sources of construction materials. Alternative sources of aggregate are available in other adjacent locations in the San Joaquin Valley, the lower Sacramento Valley, and in the

[illegible]

IV.B-6

San Francisco Bay Area. The nearest adjacent supplies are those produced in southern and eastern Sacramento County, the lower Stanislaus River east of Modesto, and in Pleasanton. However, permitted aggregate resources in these areas only remain available to meet short-term needs. Long-term shortages of material are expected to occur if additional deposits are not permitted. In addition, several major production areas in the San Francisco and Sacramento areas have been or are near depletion.⁹

If current sources of construction aggregate were depleted or become unavailable, there are potentially substantial deposits classified MRZ-3 in the foothills in eastern San Joaquin County, though the quality and quantity of material is unknown. Not all sand and gravel deposits may be feasible to excavate. Many factors determine feasibility, including market demand, competition, ease of excavation, and the quality of the resource. Transportation costs are important and usually prohibit long distance hauling of the resource. Deposits which are close to developing areas should be utilized to the fullest extent possible and protected from incompatible uses.

3. NATURAL GAS

Land Use Characteristics. Natural gas is withdrawn through wells from subsurface fields, and there is little disruption or interference with other surface land uses. Agricultural fields cover most gas reserves in the County, although there exists a potential gas field beneath Stockton. Figure IV.B-3 shows existing active and abandoned natural gas fields.

Location and Quantity. Natural gas has been extracted from San Joaquin County since 1854 when a water-well drilled in Stockton supplied both gas and water. The first commercial gas deliveries, made in 1935, came from the Tracy gas field. In 1986 there were 13 producing gas fields in San Joaquin County. One hundred eighteen wells situated on these fields produced approximately 21.9 billion cubic feet (MMcf) of natural gas (see Table IV.B-4).¹⁰ Overall there are 21 natural gas fields in San Joaquin County which either are active or produced gas in the past, as shown in Figure IV.B-3.

Most natural gas extraction activities in San Joaquin County take place in the vicinity of the Delta. The Lathrop, McDonald Island, and Union Island gas fields account for a majority of all the natural gas extracted from the County. In recent years, the Union Island gas field has been most active producing over 50% of the countywide annual production.¹¹ During 1988, annual production from the Union Island gas field reached 1.4 million cubic feet, over 63% of the County's annual gas production.¹⁰

The Department of Conservation, Division of Oil and Gas, estimates the quantity of natural gas reserves remaining in each gas field. Estimated gas reserves are greatest in the Union Island gas field (83,298 MMcf) and the Lathrop gas field (29,558 MMcf). An estimate of the total County reserves as of December 31, 1986 was 131.2 billion cubic feet (MMcf).¹²

In addition to the extraction of natural gas, there is a gas storage project on McDonald Island operated by Pacific Gas and Electric (PG&E). Since 1959, PG&E has purchased gas, transported it to McDonald Island, and injected it into the field for storage.

Potential Hazards. Throughout the history of natural gas extraction in San Joaquin County, there has only been one major accident. An explosion at the McDonald Island field occurred in 1974 and the resultant fire continued for 19 days and burned 14.8 Mmcf of natural gas. Although the likelihood of

TABLE IV.B-4: NATURAL GAS EXTRACTION IN SAN JOAQUIN COUNTY

<u>Year</u>	<u>Net Gas Extracted Billion Cubic Feet (MMcf)</u>	<u>Year</u>	<u>Net Gas Extracted Billion cubic Feet (MMcf)</u>
1964	43,598	1976	30,270
1965	45,474	1977	32,044
1966	36,809	1978	30,732
1967	26,588	1979	23,083
1968	34,833	1980	23,565
1969	40,636	1981	28,443
1970	43,936	1982	18,791
1971	42,322	1983	17,897
1972	55,858	1984	16,548
1973	43,834	1985	22,344
1974	17,614	1986	21,887
1975	15,814	1987	23,398

Source: California Resources Agency, Department of Conservation, Division of Oil and Gas, Summary of Operations - Oil, Gas and Geothermal Production Statistics, 1964-1973, Annual Report of the State Oil and Gas Supervisor; 1974-1987, personal communication with the Division of Oil and Gas.

accidents or hazards are slight, they include gas seepage from the deposit or the pipelines, blowouts (mud, sand, gravel, rocks, water, gas or a mixture of these) while drilling the well, contamination of waterways or water supplies from wastewater disposal and subsidence over a gas field. Blowouts and fires can have particularly dangerous results including damage to property, loss of the resource, human injury, and disruption of surface land uses.

Regulation and Controls. The State Department of Conservation, Division of Oil and Gas regulates the drilling, operation, maintenance and abandonment of gas wells to prevent damage to the gas and other resources as a result of such operations. The State also requires that applicants for natural gas extraction post a surety bond to cover the cost of potential environmental damage. In addition, individuals who wish to engage in oil or gas drilling within San Joaquin County must obtain permits from local authorities.

Future of the Industry. Currently producing natural gas reserves in San Joaquin County are expected to be depleted by the end of the 20th century. However, new fields and pools are being discovered through exploration and drilling.¹⁰ Chevron U.S.A., Inc. has completed enough exploratory drilling in the field to know that there is natural gas below Stockton. Current exploration activity will help determine whether there are commercial quantities of gas in the Stockton field.¹³

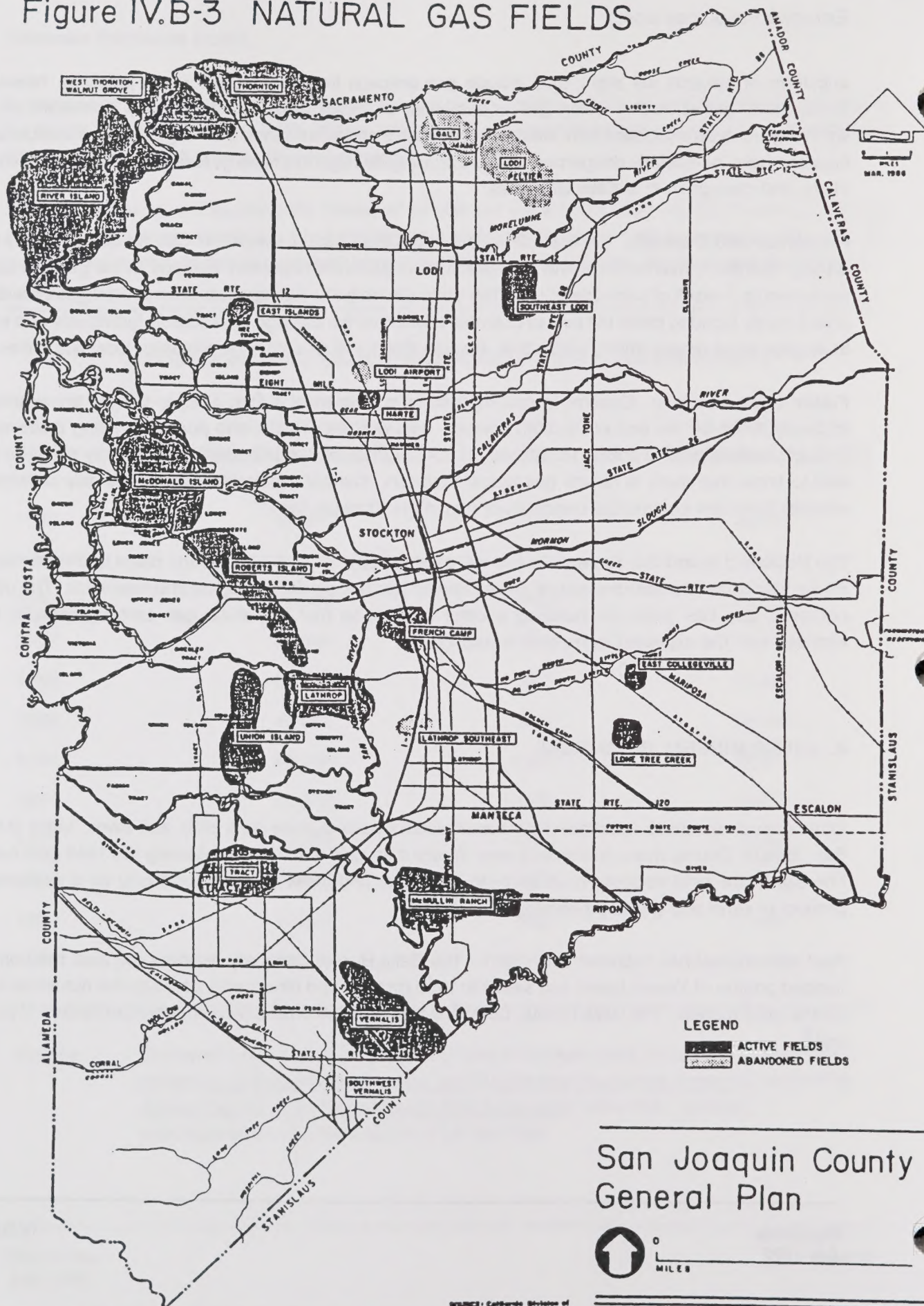
The McDonald Island Gas Storage Project will continue operation. PG&E reports plans to drill new wells on the island and increase the natural gas extraction rate through technological improvements. The utility company also has plans for installing another pipeline so that its natural gas carrying capacity will increase with the expected increase in extraction.¹⁴

4. OTHER MINERAL RESOURCES

Other natural resources withdrawn from San Joaquin County include gold, peat, and silver. Many of the San Joaquin County rivers and creeks were dredged for gold in the years following the 1849 gold rush. The significant gold deposits have all been extracted, and today gold is found only as a secondary product of sand and gravel processing.

Peat soil removal has occurred since 1971. The Delta Humus Company removes the peat soil from a flooded portion of Venice Island and sells it to local growers and others who package the nutritional soil for the retail market. The Delta Humus Company is one of California's two producers/extractors of peat soil.²

Figure IV.B-3 NATURAL GAS FIELDS



Endnotes

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12. California Department of Conservation, Division of Oil and Gas. Seventy-second Annual Report of the State Oil and Gas Supervisor. 1986.
13. Larry Hirst, Chevron U.S.A., Incorporated. Personal communication. November 1983.
14. Rick Holden, Pacific Gas and Electric Company. Personal communication. November 22, 1983.

References

1. San Joaquin County Planning Department. A Review of San Joaquin County's Extractive Industries, Preliminary Draft. February 1969.

1. The purpose of this document is to provide information regarding the status of the project.

2. The project is currently in the planning stage and is expected to be completed by the end of the year.

3. The project is being managed by the Project Manager, who is responsible for the overall progress.

4. The project is being funded by the Department of Defense, which is providing the necessary resources.

5. The project is being implemented by the Department of Defense, which is providing the necessary resources.

6. The project is being implemented by the Department of Defense, which is providing the necessary resources.

7. The project is being implemented by the Department of Defense, which is providing the necessary resources.

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20. The project is being implemented by the Department of Defense, which is providing the necessary resources.

C. ENERGY

1. OVERVIEW: RECENT TRENDS IN ENERGY CONSUMPTION

Over the last decade, energy conservation programs have allowed Californians to significantly reduce their per capita consumption of electricity and natural gas. The California Energy Commission estimates, for example, that between 1977 and 1985 enough energy was conserved statewide to avoid constructing the equivalent of six nuclear power plants (each of which would have been capable of supplying 1,000 MW of peak-period electrical capacity). By and large, improvements in energy efficiency are expected to continue through the end of the century. Natural gas, which accounts for 25 percent of total statewide energy consumption, is projected to experience continuing reductions in per capita consumption. Electricity usage, conversely, is anticipated to rise slightly on a per capita basis, largely because households and businesses are buying more appliances and equipment.

Another recent trend is that changes in the structuring of utility rates are providing customers with an incentive to reduce energy usage during peak periods of consumption. Utilities are "unbundling" their rates and charging customers different amounts for different components of service. This restructuring is expected to lead to higher energy bills for residential consumers and small-businesses and lower bills for large industries. Although this shift in demand does not necessarily result in a net saving of energy, it reduces the need for additional power plants by improving the utilization of existing facilities.

The anticipated increase in residential energy bills will provide an incentive to continue exploring new ways to achieve energy efficiency in homes. Indeed, the California Energy Commission estimates that a typical home built after 1983 consumes approximately half the energy of a home constructed 15 years earlier. This reduction in consumption is attributable to state building and appliance standards that were promulgated to improve residential energy efficiency. New homes, for example, have significantly higher levels of insulation (ceilings now have R-30 insulation, whereas prior to 1975 ceilings averaged only R-11), improved weatherstripping, vapor barriers, double-pane windows, and more efficient heating/cooling systems. Older homes, even when retrofitted, are often unable to achieve the efficiency advantages of the new homes.

Although California's business sector has improved its energy efficiency over the last decade, additional savings during the next ten years are not expected to be as impressive. This is generally a result of the aforementioned rate restructuring which, by reducing the cost of energy for large users, is also reducing the economic incentive to conserve. Small businesses, conversely, are likely to experience higher energy bills; conservation programs are expected to become increasingly attractive for these users.

2. ACHIEVING ENERGY CONSERVATION

The goal of energy conservation is to reduce the use of depletable or nonrenewable energy resources. Reduced consumption may be achieved either by the more efficient use of these resources or by replacing them with renewable or nondepletable resources.

Various arguments may be advanced supporting each alternative. The technology for the more efficient use of resources is well developed, easily understood, and is presently cost effective. It may be argued that this approach mistakenly perpetuates an undesirable dependency on resources which will become increasingly costly and less available. The extension of this argument is that society should immediately begin substituting the use of renewable, nondepletable resources (sometimes called alternative energy resources) for depletable resources. In response, it may be argued that while the technologies for some of these alternative energy sources, most notably solar, are highly developed, public understanding is less well developed and not all of these technologies are presently cost effective.

The obvious third alternative toward energy conservation is an approach which stresses the more efficient use of depletable energy in the short run, and the long term shift to nondepletable resources.

Scope of the Conservation Program. For purposes of energy planning, it is useful to distinguish the various sectors of the total energy demand pattern which is under study. The sectors most commonly used are residential, commercial, industrial, agriculture, government, and transportation. These distinctions aid in the analysis of energy demand relative to supply, which in turn leads to the identification of conservation opportunities. Once the conservation opportunities presented by the various demand sectors have been identified, a decision must be made whether the conservation program should be universally applicable, or should it concentrate implementation resources only in those demand sector(s) which demonstrate the greatest conservation potential.

Sector-specific conservation programs raise equity issues and consequently may be politically unpalatable, even though they may be the most cost-effective. Conservation programs which affect everyone are generally perceived as being fair and even-handed, but they may spread implementation resources so thinly that significant conservation opportunities are either missed or are not fully exploited.

Retroactive or Prospective Operation. An energy conservation program may apply to buildings, facilities, and equipment which will be constructed or fabricated after its effective date, or it may operate retroactively and apply to existing buildings, facilities, and equipment. Prospectively effective programs are generally more readily accepted than retroactive conservation programs, especially if a retroactive program uses coercive elements to achieve its goals. This preference for prospective programs is a political reality and reflects the fact that those who must bear their costs are not specifically identifiable, while those who may pay the costs of a retroactive program know exactly who they are. The fact that the front end and life-cycle costs of a retroactive program will be exceeded by its benefits in terms of energy savings does not usually make it any more agreeable.

In communities which are at or near build-out, conservation programs which only prospectively apply to buildings, facilities, and equipment will have limited impact. Here the public's dislike for retroactive programs must be balanced against the depth of its commitment to energy conservation.

Implementation. The mechanism selected to implement a conservation program is a potentially controversial subject. Essentially, there are three broad options – education, incentives, and mandates.

Implementation through education relies on demonstrating the benefits of a program to its target audience in the hope that some of its members will be persuaded to use it. Education may take a variety of forms, including advertising, workshops, and individual consultation.

Incentive mechanisms may be positive or negative. Positive incentives encourage participation in energy conservation programs by reducing their front-end costs, and they may take the form of tax credits, low interest loans, and grants. Negative incentives encourage participation in conservation by artificially increasing energy costs, either through use taxes, differential rate schedules and similar devices.

Mandatory implementation is coercive in nature. Participation in conservation programs is secured by the threat of either civil penalties or denial of land use permits and entitlements.

As noted above, the selection of an appropriate mechanism to implement a conservation program is a politically sensitive issue. If rigorously enforced, mandatory implementation will ensure the highest degree of participation. However, mandatory conservation programs, especially if they are retroactive in application, are likely to be unpopular. Their opponents will argue that if their energy savings are so significant, public education combined with economic self-interest will guarantee participation. Advocates of mandatory programs respond by pointing to the resumption of "old" energy habits following the end of the 1973-1974 energy crisis, despite vigorous public education efforts by government at all levels and energy utilities. Incentive programs offer a less than satisfactory compromise between educational and mandatory programs.

Conservation by Technology or Behavior. Energy conservation may be achieved by solutions which rely on technology, behavior, or some combination thereof. A purely technological solution to energy conservation by reducing solar heat gains and consequently air conditioning heat loads would be to install fixed, structural overhangs or awnings on east and west facing windows. A purely behavioral solution would be to turn the air conditioner off and adapt to warmer interior temperatures. Mixing technology and behavior, another solution is the installation of moveable window shades or blinds which would be raised or lowered at appropriate times during the day by the building's occupants. In this last example, the technology by itself will not conserve energy.

The chief advantage of purely behavioral solutions is their negligible or nonexistent capital costs. However, energy conservation through behavior requires significant lifestyle changes and consequently a deep personal commitment. On the other hand, purely technological solutions, once the initial decision is made to employ it, operate without any need for attention beyond routine maintenance.

3. CONSERVATION OPTIONS BY SECTOR

This section lists specific conservation program options for the following energy demand sectors – residential, commercial, industrial, agricultural, government, transportation and the aggregate land use

pattern of these sections. Although this listing of options is by no means exhaustive and, accordingly somewhat abstract, it does display an array of options which should be considered when formulating programmatic energy conservation strategies.

Before proceeding, it is necessary to define some terms. An "energy conservation action" is a discrete method or technique for conserving energy. An example is insulating an attic to R-30.¹ An "implementation mechanism" is a means of putting a conservation action into effect. The three types of implementation mechanisms – educational, incentive, and mandatory – were discussed in the previous section. A "conservation program" is the result of combining a conservation action with an implementation mechanism. Using the above example, here are the three types of conservation programs:

- (1) Achieve attic insulation through public workshops stressing the economic benefits and demonstrating do-it-yourself installation;
- (2) Achieve attic insulation through a utility-financed, long-term low interest loan program to cover contract installation costs; and
- (3) Achieve attic insulation by mandating it at time of resale of the unit.

Listed below for each energy demand sector are conservation actions and implementation mechanisms.

Residential Sector Options

Conservation Actions

- (a) Space Heating and Cooling
 - Manually set back thermostat during the day and at night (new and existing homes)
 - Install automatic thermostat set back device (new and existing homes)
 - Weatherstrip doors and windows (existing homes)
 - Insulate ceilings with accessible attics to R-30 (existing homes)
 - Insulate floors over unheated attics or crawl spaces to R-11 (existing homes)
 - Install storm windows (existing and new homes)
 - Insulate space heating ducts located in unheated areas (existing homes)
 - Maintain furnace efficiency by cleaning filters and adjusting burners in all forced air furnaces (existing and new homes)
 - Replace pilot light in gas furnaces with electric ignition devices (existing and new homes)
 - Heat houses selectively by zone (existing and new homes)

¹ R-values are a measure of resistance to heat transfer or flow. The higher the R-value, the greater the resistance to heat transfer. Therefore, an attic with R-30 insulation retains more interior heat during winter months and keeps out more exterior heat during summer months than an attic with R-11 insulation.

Energy (cont.)

- Build multiple unit housing to increase common walls and floors/ceiling, thereby reducing number of surfaces exposed to weather (new homes)
- Orient homes to take advantage of solar heat gains in winter and to reduce summer solar heat gains (new homes)
- Install active solar space heating systems (existing and new homes)
- Provide shading for windows on east, west, and south sides of house to reduce solar heat gains in summer (existing and new homes)

(b) Water Heating

- Wrap insulation around hot water tank
- Lower hot water tank temperature settings
- Install flow restrictors in shower heads
- Wash clothes in cold water
- Replace gas water heater pilot lights with electric ignition devices
- Install solar assisted hot water heating systems
- Use insulation blankets on swimming pools and hot tubs

(c) Appliance

- Replace gas range pilot lights with electric ignition devices
- Reduce the use of appliances and improve the energy efficiency of those which are essential
- Use solar clothes dryer (clothesline)

(d) Lighting

- Replace incandescent lamps with fluorescent lamps
- Replace existing bulbs with lower wattage bulbs
- Turn off lights when not in use
- Substitute day lighting for artificial lighting

Implementation Mechanisms

(a) Education

- Advertising campaigns, seminars, and workshops
- Individual home audits and consultation
- Appliance and equipment labeling
- Conservation courses in grade, high schools, adult and continuing education program

(b) Incentive

- Low interest government loan or direct grant
- Utility or bank, low interest, long-term loan
- Tax on energy consumption over established limits

- (c) Mandatory
 - o Appliance and habitability system efficiency standards
 - o Resale requirements for existing buildings
 - o Building code modification for new construction

Commercial Sector Options

Conservation Actions

- (a) Space Conditioning
 - o Restore existing HVAC (heating, ventilation, and air conditioning) equipment to maximum efficiency; periodically reinspect to maintain efficiency
 - o Reduce hours of operation of HVAC equipment
 - o Install automatic thermostat setback devices
 - o Institute load management programs
 - o Install storm windows
 - o Increase insulation of exterior structure surfaces
 - o Reduce outside air ventilation rate
 - o Orient structure to reduce summer solar heat gains and to increase winter solar heat gains (new construction)
 - o Increase natural ventilation during summer months
 - o Install active solar space heating system
 - o Reduce ceiling heights
- (b) Water Heating
 - o Reduce temperature setting on water heating system
 - o Reduce hot water consumption
 - o Use waste heat from space heating system to preheat water
 - o Install solar hot water heating system
- (c) Lighting
 - o Reduce use of lighting for advertising signs
 - o Reduce lighting in nonwork areas
 - o Replace gang lighting with task lighting
 - o Limit size of floor area illuminated by individual light switches
 - o Replace artificial lighting with natural lighting
 - o Replace incandescent lighting with fluorescent lighting
- (d) General
 - o Install individual electric and gas meters for each tenant of a commercial structure

Implementation Mechanisms

Energy (cont.)

- (a) Education
 - Advertising campaigns and workshops
 - Individual building audit and consultation
- (b) Incentive
 - Government low interest loans or direct grants
 - Utility or bank low interest, long-term loans
 - Tax on commercial energy use
- (c) Mandatory
 - Resale requirements for existing buildings
 - Building code modifications for new construction
 - Equipment efficiency standards
 - Restrictions on outdoor advertising lighting

Industrial Sector Options

Conservation Actions

Many of the conservation actions listed above for the residential and commercial sectors also are applicable to the industrial sector. To avoid repetition, they are not listed here. Also, since industrial conservation actions tend to be industry or product specific, identification of these actions must await further analysis of San Joaquin's industrial sector. Listed below are conservation actions of general applicability.

- Institute good housekeeping practices to eliminate energy waste.
- Change product characteristics to require less energy-intensive fabrication.
- Use optimally efficient processes, equipment, pumps, and motors.
- Maximize use of recycled materials
- Recover waste heat to provide space heating to adjacent commercial and residential structures through district heating.
- Recover waste heat for cogeneration of electric power.

Implementation Mechanisms

- (a) Education
 - Advertising and workshops
 - Energy use audit and construction
- (b) Incentive
 - Government low-interest, long-term loans

Energy (cont.)

- Tax on energy use
- Industrial development bonuses for energy efficient industries

(c) Mandatory

- Require EIRs for new industrial development to assess energy impact; restrict development of energy intensive, low employment industries

Agriculture Sector Options

Conservation Actions

- Improve energy management of farm machinery by tuning equipment motors on a regular basis, and by reducing the frequency and duration of trips per vehicle.
- Practice minimum soil tillage
- Practice integrated pest management
- Use nitrogen-fixing cover crops as part of a crop rotation schedule
- Use wind energy for water pumping operations; improve water conservation to minimize pumping
- Repair or replace inefficient pumps
- Reduce consumption of petroleum-derived fertilizers
- Install heat exchangers using fresh milk as the heat transfer medium to preheat water prior to delivery to hot water heater
- Recover waste heat from dairy equipment (e.g., compressors, vacuum pumps) to preheat water prior to delivery to hot water heater
- Install solar hot water heating system
- Investigate relative energy consumptions of mechanical (tractor driven scraper) versus water flushing for removal of animal waste from barns using freestall housing
- Use municipal wastewater for irrigation purposes to produce forage in-County which would replace imported forage brought in by truck

Implementation Mechanisms

(a) Education

- Workshops, seminar
- Demonstration projects

(b) Incentive

- Government loans and grants
- Technical assistance

Government and Institutional Sector Options

Conservation Programs

- (a) Government Vehicles
 - Use more energy efficient vehicles
 - Reduce government vehicle travel
 - Initiate government drivers energy efficient training program
- (b) Government Buildings/Facilities
 - See conservation actions for residential and commercial sectors
 - Perform energy audits and implement energy management programs
 - Establish energy budgets for discrete facilities
 - Convert to more energy efficient street lighting systems
 - Utilize life-cycle costing in outfitting facilities with major energy consuming equipment
- (c) Government Operations
 - Implement resource recovery for paper products
 - Establish department energy budgets and conservation goals
 - Designate energy conservation coordinator for government in-house operations; initiate employee education programs

Transportation Sector Options

Conservation Actions

- (a) Employment Related
 - Increase occupancy or load factors of commuter private automobiles through carpools, ridesharing, licensed hitchhiking, preferential parking for carpools
 - Improve peak hour traffic flow through traffic signal synchronization, metered access to freeways
 - Initiate vanpool commuting
 - Improve commuter transit system
 - Install bicycle storage facilities
- (b) Non-Employment Related
 - Plan and consolidate trips, eliminate non-essential trips
 - Increase opportunities for walking and bicycling
 - Improve intra-county transit system
- (c) General
 - Use more energy efficient vehicles
 - Lower vehicle speeds

Implementation Mechanisms

- (a) Education
 - o Advertising and information campaigns
- (b) Incentive
 - o Government financing and subsidization of transit and carpooling programs
- (c) Mandatory
 - o Establish lower speed limits and vigorously enforce them
 - o Transportation Reduction and Improvement Program (TRIP) ordinances

Land Use Sector Options

Conservation Actions

- (a) Residential Land Use
 - o Increase housing densities along and near existing and future major transit routes and stations
 - o Increase housing densities near major in-county employment opportunities and in west-county near Bay Area commute destinations.
 - o Increase housing densities near shopping centers
 - o Provide rental units in large single family dwellings
 - o Construct small housing units on undersized or substandard lots
 - o Increase construction of two story single family homes and multiple unit housing
 - o Mix residential/commercial/industrial uses
- (b) Commercial/Industrial Land Use
 - o Decentralize household food and goods distribution through neighborhood grocery stores
 - o Limit the expansions of strip commercial development
 - o Increase home occupations and offices
 - o Mix residential/commercial/industrial uses
 - o Increase in-county employment opportunities for residents now commuting out of county
 - o Encourage neighborhood or satellite business offices
 - o Encourage telecommuting and teleconferencing

Implementation Mechanisms

- (a) Education
 - o Advertising and information campaigns

- (b) Incentive
 - o Appropriate revisions of general plan, zoning and subdivision ordinances, EIR guidelines to encourage energy conserving land use pattern
- (c) Mandatory
 - o Appropriate revisions of general plan, zoning and subdivision ordinances, EIR guidelines to require energy conserving land use pattern

4. CRITERIA FOR DEVELOPING ENERGY STRATEGIES

The following criteria should be used when formulating specific strategies to reduce energy consumption.

Amount and Type of Energy Saved. The future availability of conventional fuels is the bottomline criterion for reducing energy use. An economic analysis is meaningless if there is simply no energy available.

While it is important to save all types of nonrenewable fuels, perhaps the most critical action in the immediate future is to reduce the use of summer peak-load electricity, which means reducing the use of air conditioners. This also reduces the need to build new power plants. Passive cooling, natural ventilation and daylighting are even more important in commercial facilities which consume most of the summer peak load.

There appears to be an abundance of natural gas available right now. However, as reliance shifts from domestic to imported sources, it is becoming more expensive and less reliable. The long-term availability of gasoline is likewise uncertain and its increasing cost seems to be assured given that supply is limited and subject to control through supply cartels. The long-term supply is unquestionably limited. The production of synthetic fuels as an alternative will require enormous governmental subsidies and its production is expected to cost ten times as much as oil cost in the recent past.

Economic Return from Investment. An essential criterion for choosing among energy efficiency options is the cost-effectiveness of the options for the investor. There are many different methods for evaluating the economics of an investment in energy efficiency. Two commonly used methods are present-value, life-cycle-cost analysis and cash flow analysis.

The life cycle cost approach adds up all costs and savings over the life of an investment or over a predetermined period of time. For evaluating energy efficiency in structures 20 years is usually selected as a time period to which investors can relate.

"Present value" refers to the discounting of future costs or savings to their present value. Future dollars are worth less than present dollars because of inflation and because of the basic preference of consumers for money available today over money that will be available in the future because money available today

can be invested to make money. The discount rate should reflect the profit that could be made by investing the money available today in something else.

An energy efficiency option is cost effective when the present value of the costs of owning and operating it are less than the present value of the savings in energy costs that result from its use.

The cash flow approach compares costs and savings on an annual basis. This is the most meaningful analysis for the homeowner or buyer if the energy-efficiency option is being financed with a loan or as part of the mortgage on the house. In this case, the monthly payment on the loan remains fixed while the cost of conventional energy increases as a result of inflation and increased energy costs.

Both methods are used in the evaluation of options available to homeowners and a payback period is identified for each. The payback period refers to the number of years until cumulative saving exceeds cumulative costs.

Political Acceptability. Some actions are not currently viable in San Joaquin County for political reasons. In particular, land use patterns that create an increase in density are often met with resistance. Acceptance of this and other related concepts depends on further clarification of their implications for energy savings and impacts on quality of life. These measures are proposed for consideration in the longer-term future.

Long-Term Consequence. In some cases it is very easy and inexpensive to implement an energy efficiency option at one time and much more difficult and costly to do so later. This is especially true of passive design measures. It costs nothing to provide for solar access in a new structure but may be impossible to do so once it has been built. Since a residential structure built today will probably still be standing 75 or 100 years from now, it is critical that it be built right in the first place.

Similarly, it is relatively easy to add a solar water heater to a house 5 or 10 years from now if it was constructed with a roof area with the proper solar orientation and slope. In contrast, a house constructed in ignorance of solar access may not have this option.

Another example of the long-term energy implications of design decisions is the relationship of a given land use pattern to the transportation system required to service it. A pattern characterized by large residential lots will virtually guarantee dependence on the automobile. In contrast, the concentration of the same number of residents on smaller lots within walking distance (1000 feet) of major streets will generate a level of transit ridership sufficient to guarantee self-supporting (i.e., fare box revenues cover costs) public transit. In both cases, the type and overall intensity of land use is the same. It is the spatial arrangement of more concentrated pattern which determines the success of its transportation system.

Options for which the retrofit potential is limited or foreclosed by the design of a residence, commercial structure, neighborhood, etc. are given high priority for immediate implementation.

5. FACTORS AFFECTING IMPLEMENTATION OF ENERGY-EFFICIENCY PROGRAMS

The Residential Sector. Over the last decade, energy efficiency has become a very important consideration when a household is buying a new home, ranking only behind total cost and location of home. Likewise, buyers of household appliances rank electrical efficiency as the most important factor, after price, in selecting an appliance for purchase. Clearly, attaining energy conservation through improved efficiency is high on the agenda of the average household in California.

Additional gains, however, can still be made in improving the energy efficiency of homes. Title 24 standards, for example, present a **minimum** standard for efficiency-considerations in home design. Homebuilders have no incentive to exceed these standards, and without adequate knowledge of the benefits homebuyers are unable to demand improvements in efficiency. Consumers are likewise often unaware of the extent to which they can save money over the long run through the purchase of energy-efficient appliances. Providing adequate efficiency information to the consumer, though, is not necessarily a simple task. The way the information is packaged, its clarity, and the credibility of its source are all important variables that affect the extent to which efficiency information, once it is made available, is applied by the consumer. Unfortunately, an ill-informed decision on the part of the consumer can have expensive consequences. The cost to install wall insulation on a retrofit basis, for example, can be twice the cost of having it installed when a home is being constructed.

The Commercial Sectors. Achieving energy conservation in the commercial sector is relatively difficult, as businessmen rarely view energy as a significant factor affecting net profits. Indeed, commercial energy usage per square foot of floor space has been on the increase, largely as a result of the proliferation of computer and telecommunications equipment in the modern businessplace.

The extent to which a business is willing to manage its energy consumption is a function of its size, whether it owns or leases its space (and the terms of the lease entered into), and its energy costs relative to profits. In general, firms most interested in saving energy are those that involve the management of large buildings or chains of buildings (e.g., office buildings, hotels). Like many homebuyers, businessmen tend to be relatively ignorant of financial benefits that can be achieved through conservation programs. It is important, however, that this information be provided in a format to which they can easily relate their other costs and revenues, and which can be quickly utilized in making a decision.

The Industrial Sector. As with firms in the commercial sector, the extent to which a particular industrial firm pursues energy conservation is largely determined by that firm's size, whether it leases or owns its building(s), its energy usage relative to profits, and the nature of its production processes. In general, industrial managers will attempt to achieve energy conservation when (a) the program provides demonstrable return on investment, and (b) when the program improves production.

Energy-intensive industries include those involved in chemical production, petroleum extraction and refinement, pulp and paper manufacturing, and the processing of primary metals. Energy, for these industries, is a critical factor in production and profits.

The Agricultural Sector. The agricultural sector is heavily reliant upon energy usage. Petroleum products and natural gas are integral to the planting, growing, harvesting, processing, handling and transporting of most crops. Pump-fed irrigation, for example, requires a significant amount of electrical power (in 1986 electricity powered more than 90 percent of all agricultural pumps in the state, and accounted for 17 percent of all energy used in the agricultural sector), and the large farms in the Central Valley would be unmanageable without petroleum-fueled machinery.

The extent to which an agriculturalist is interested in achieving energy conservation is largely a function of farm size, lease terms (if farmed by a tenant), and type of crop(s) grown. Although farmers and farm managers are very interested in finding ways to reduce operating costs without also reducing productivity, they frequently lack the resources needed to explore and experiment with innovative energy-saving machinery and methods. Technical assistance, particularly that provided by traditional agricultural advisors (e.g., agricultural extension agents), is critical when trying to motivate farmers into pursuing energy-conservation objectives. The California Energy Commission is currently developing a Farm Energy Assistance Program to provide farmers with the financial and technical assistance needed to reduce agricultural energy use.

Local Government and Institutional Sector. With regard to electrical power, local governments and institutions are able to improve the energy efficiency of their operations by using load management strategies that focus on reducing peak-period energy demand. This is often difficult, however, because almost no incentive exists for department managers to maximize the efficiency of their energy-using operations—assuming that these managers even have the expertise to develop an energy management program. Likewise, tax reform measures that have been enacted since 1977 reduce the likelihood that energy-conservation projects will receive funding if the department's budget is already overstrained with competing demands.

The State is attempting to remove some of the barriers that have traditionally prevented local governments and institutions from attaining energy efficiency in their operations. In 1986, for example, the Legislature approved SB 880, which sets up technical and financial assistance programs that will enable local governments to reduce their energy usage. The California Energy Commission also provides technical assistance through its Energy Partnership Program. Unfortunately, though, existing State energy programs currently provide neither technical nor financial assistance to special districts.

D. AIR QUALITY

1. INTRODUCTION

Air pollution has been a recognized feature of the climate of the Central Valley for all of recorded history. Natural sources of air pollution consisted primarily of particulates from wind blown dust, fires, and hydrocarbons emitted from natural vegetation. However, as a problem, air pollution is relatively recent within the area and comes from two major sources: mobile sources (e.g., cars and trucks) and stationary sources (e.g., industry). A detailed analysis of air pollution in San Joaquin County is available in the San Joaquin County 1982 Air Quality Management Plan.

2. AIR QUALITY CONDITIONS

Air pollution is a regional problem. It has been assumed that due to the prevailing west winds during the summer that some of San Joaquin County's summer air quality problem is a result of pollutants being transported from the Bay Area. Studies have confirmed this, but the specific source or sources which contribute to the County's pollution problems is unknown.

San Joaquin County is located at the northern end of the eight county San Joaquin Valley Air Basin. The pollution potential for this air basin is very high due to the topographic and meteorological conditions which often allow the concentration of air pollutants. The only air monitoring station in San Joaquin County that has been operating consistently since 1987 is the Stockton/Hazleton station.

Major Air Quality Problems. San Joaquin County's major air quality problems occur from late spring through early winter. From May to October high ozone levels are a recurring problem due to the region's intense heat and sunlight. Pollution problems also occur from October through January due to frequent strong temperature inversions which trap pollutants near the earth's surface. These stagnant air conditions can last for weeks at a time. During these periods carbon monoxide levels rise. The presence of visibility-reducing particulates are a problem much of the year. Dust from spring winds and agricultural operations, including agricultural burning, account for most of the area's particulates. These three pollutants are critical because monitoring levels for them show them to exceed the National Ambient Air Quality Standards (NAAQS) in the past. Available data on them is presented below.

Ozone. No exceedance of the NAAQS was recorded at the Stockton/Hazleton monitoring station during 1985 and 1986. Over the three-year period 1984-1986, the standard was reached or exceeded only seven days. This record represents an improvement over previous years. A second monitoring station in Stockton, operating since 1984, has recorded exceedances in 1984 and 1986. Monitoring data also includes information on reactive organic gases (ROG, or reactive hydrocarbons) and nitrogen oxides (NO_x) which are precursors to the formation of the ozone.

Carbon Monoxide (CO). The number of days during which the 8-hour NAAQS was exceeded has dropped sharply since 1979. During 1986 the standard was exceeded only once. Partly as a result of

this record of improvement, the rural portion of the County has already been redesignated as an attainment area for CO.

Total Suspended Particulates (TSP)¹. In July 1987, NAAQS for TSP were revised to consider only those particles with a diameter less than 10 micrometers (PM-10). The U.S. Environmental Protection Agency created three groups by which to rate air basins on their attainment with the TSP standards. San Joaquin County is classified a Group II area, having a moderate probability of exceeding the standards. Group II areas are required to develop a committal PM-10 Nonattainment Area Plan but are not required to implement them until violations of the standard are recorded. Monitoring began in 1985 by the State Air Resources Board (ARB) and the County has exceeded the TSP standard only twice.

Between 1975 and 1987, average tons/day emissions have increased from 60 tons to 74 tons, of which over 90% derives from stationary sources. The primary contributions in 1987 were paved road dust (26 tons), farming operations (20 tons), and construction and demolition (13 tons).

Emissions Inventory². Mobile sources such as highway vehicles and other transportation systems are the greatest single contributor to air pollution in the County (see Table IV.D-1). According to the ARB 1979 inventory, mobile source emissions account for 31% of the County's reactive hydrocarbon inventory, 72% of carbon monoxide, and 61% of nitrogen oxides. Stationary sources account for 23% of the County's 1979 reactive hydrocarbon output. Area sources are the County's largest source of reactive hydrocarbons, accounting for 45% of this inventory, 28% of the carbon monoxide inventory and 40% of nitrogen oxides.

Pesticide use, which includes herbicide use, also contributes substantially to the County's air quality problems. Approximately one half of all pesticides used are applied from the air. Alone, pesticide hydrocarbons accounted for 33% of the 1979 inventory and are the largest single source of reactive hydrocarbons in the County. Most of the County's pesticide emission results from use of hydrocarbon-based chemicals for weed control. These herbicides are used most heavily during spring and early summer field preparations, on alfalfa and on certain field crops. Much of the remaining hydrocarbon emissions result from the use of petroleum distillates and solvents during the growing season. A more recent 1985 emissions inventory has been prepared by the ARB but was unavailable as this material was prepared.

3. LEGISLATION

The Federal Clean Air Act, enacted in 1970, authorized the Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) and to mandate the states to develop a program for attainment and maintenance of these standards. The purpose of establishing standards was to protect the public health. Secondary standards were also established to protect resources such as soil, crops, wildlife and vegetation.

Congress amended the Clean Air Act in 1977 to require the identification of areas which did not meet the NAAQS. A nonattainment plan was required for each area showing how the standards would be met by 1982. Because some areas in California were not going to be able to attain the standards by 1982, the State was granted an extension to 1987. This deadline has been extended. The California Clean Air Act, effective January 1989, imposes additional air quality standards as well, including annual reductions in emissions of 5%.

Since San Joaquin County was identified as exceeding three of the national standards, namely those for ozone, carbon monoxide, and total suspended particulates, an Air Quality Management Plan (AQMP) was prepared. The AQMP established a reduction program for hydrocarbons (RHC) and carbon monoxide (CO). The PM-10 Nonattainment Area Plan for the reduction of the total suspended particulates is the responsibility of the State Air Resources Board (ARB).

TABLE IV.D-1: 1979 EMISSIONS BY CLASSIFICATION (TONS/DAY)

<u>Classification</u>	<u>ROG</u>	<u>CO</u>	<u>NO_x</u>
Mobile Sources	30.30	233.40	34.00
Stationary Sources	23.57	.05	.01
Area Sources	44.64	87.72	22.44
Total	98.51	311.17	56.45

Source: San Joaquin County Planning Department, 1982 Air Quality Management Plan, 1982.

4. EMISSIONS REDUCTION STRATEGIES

Air Quality Management Plan³. The San Joaquin County AQMP provides emission reduction strategies for mobile, stationary, and area sources. Attainment of the NAAQS is projected through reduction in emissions of reactive hydrocarbons (RHC) and carbon monoxide (CO). The primary strategies for RHC emissions reductions are source, area source, mobile source, and transportation control measures; for CO emissions reductions, mobile source and transportation control measures. The following are brief summaries of these strategies. A discussion of land use policies which can assist in lowering the number of trips and vehicle miles traveled is also included in this section.

Mobile Source Strategy. The mobile source strategy calls for reductions from direct control of vehicle emissions. These strategies include: 1) California's existing and on-going vehicle emission control program, 2) an anti-tampering tactic for vehicle exhaust systems and, 3) a Transportation Control Plan.

The following transportation alternatives were included in the AQMP as part of the Transportation Control Plan strategy:

- o Improved Public Transit - improve the quality and efficiency of public transit service.
- o Voluntary Ridesharing Program - ensure that commuters are informed about the benefits of ridesharing and are offered an opportunity, and are encouraged, to participate.
- o Park-and-Ride Lots - construct more park-and-ride lots and encourage the use of the existing "fringe" parking lots.
- o Bicycle Program - provide a basic framework for the development of bicycle system improvements including convenient bicycle routes, improved bicycle parking facilities and security, and promotion of bicycle use.
- o Traffic Flow Improvements - use of varying engineering techniques, such as signal synchronization, one-way streets, computerized traffic control, and removal of unnecessary signals and stop signs to decrease idling time and increase the speed of traffic.
- o Controls on Extended Vehicle Idling - improve facility design and change operations to minimize the concentration of harmful pollutants from extended vehicle idling.

Stationary Sources. The Air Quality Management Plan's control strategies for stationary sources are aimed at reducing reactive hydrocarbons. This is accomplished primarily by the New Source Review (NSR) program. The goal of this program is to prevent any net increase in emissions from the construction and operation of new major sources (and major modifications to existing sources), and to provide an off set from large sources to help mitigate the impact of minor source growth. The NSR program requires that any new stationary source which emits more than 15 pounds per hour or 150 pounds per day of any ozone precursor to apply the best available control technology (BACT). New stationary sources or modifications which receive a permit to construct and emit more than 25 pounds per hour or 250 pounds per day of certain pollutants must mitigate (offset) net emissions increases of all pollutants for which there is a national standard sufficiently to offset any new emissions increase.

Most of San Joaquin County's stationary source emissions result from sources with emissions less than limits established for the NSR program. These smaller sources are subject to other County Air Pollution

Control District (APCD) regulations which require the utilization of the most reasonably available control technology (RACT) to reduce emissions from stationary sources.

The County has also established an emissions banking program. This program provides for the "banking" of emission credits to be used and traded to offset future emission increase or emission reduction requirements.

Area Sources. Area sources consist of a wide variety of emission sources, such as off-road vehicles, aircraft, trains, agriculture, boilers and gas generators. Control strategies for these sources include: 1) a recommendation that the Air Resources Board continue developing controls for certain off-road mobile sources and utility equipment, 2) implementation of a Suggested Control Measure (SCM) for pesticides, and 3) utilization of San Joaquin County's existing agricultural burning rule.

Other Strategies. Land use policies can also affect air quality. Sprawling residential development which is not located near employment centers, shopping areas, and public transit encourages reliance on the automobile and increases the total vehicle miles driven. Low density development also makes public transit more difficult and less cost efficient to provide. In order to minimize vehicle travel associated with new growth, more compact, higher density, and infill development should be encouraged in areas where public transit is available.

The AQMP projected a population of 430,100 in San Joaquin County in the year 1990. More recent projections (used in this General Plan) estimate a somewhat higher 1990 population (see Population Housing and Employment Technical Appendix). As a result, an increase in emissions over what was projected by the 1982 AQMP can be expected. Projects which may be growth inducing (i.e., attract additional growth) should be analyzed as to their impact on air quality and the AQMP.

Implementation of the Air Quality Management Plan. The implementation of the Air Quality Management Plan is the responsibility of many agencies, including the County Air Pollution Control District, the County Planning Division, the San Joaquin County Council of Governments (COG), Caltrans, all the cities in the County, the Stockton Metropolitan Transit District, and the State Air Resources Board.

Each year a report must be prepared which assesses and describes the progress which has been made during the previous year toward attaining the NAAQS as described in the AQMP. These annual Reasonable Further Progress Reports (RFP) are to be used to report and update the implementation status of the programs and tactics contained in the AQMP to determine if the annual incremental reductions in air pollution emissions are sufficient to provide for attainment.

The 1985/1986 RFP for San Joaquin County indicated that reasonable further progress was obtained for both reactive hydrocarbons (RHC) and carbon monoxide (CO) in 1985 and 1986.⁴ The actual reduction in tons/day for RHC and CO exceeded the amount projected by the AQMP for 1985 but fell short in 1986. Pesticide emissions were substantially reduced due to economically motivated shifts from petroleum-

based pesticides to synthetic substitutes. In contrast, there has been a substantial growth-related increase in motor vehicles emissions.

PM-10 Nonattainment Area Plan. This plan presents two groups of control measures for each particulate source. The first group includes measures that should be implemented in the near future. The second group includes potential measures needing further studies. The first group of measures are presented in Table IV.D-2.

Other Emission Reduction Strategies. In addition to the emission reduction strategies in the AQMP and the PM-10 Nonattainment Area Plan, there are other actions which the County can take to reduce emissions.

Alternative Fuels. The development and use of alternative fuels can lead to less polluting forms of automobile and trucks, thereby reducing emissions from the greatest single contributor to air pollution in the County. The County should support programs which will lead to the use of alternative fuels.

Elimination of Chlorofluorocarbons. Chlorofluorocarbons are groups of compounds which contain carbon, chlorine, fluorine, and sometimes hydrogen. They are used as refrigerants, cleansing solvents and aerosol propellants, and in the manufacture of plastic foam products. To effectively eliminate the use of chlorofluorocarbons a statewide effort is necessary.

Air Quality Fees. the County should study the feasibility of collecting air quality fees. The fees could fund air quality planning and programs.

TABLE IV.D-2: PROPOSED INTERIM PM-10 CONTROL STRATEGIES

<u>Source</u>	<u>Control Strategies</u>
FARMING PRACTICES	○ modify farming practices to minimize PM-10 ○ continuing education process ○ voluntary linking of farming operations to windspeed and moisture
PAVED ROAD DUST	○ strengthen transportation control measures to reduce vehicle miles travelled
CONSTRUCTION/DEMOLITION	○ require and enforce permit conditions ○ educate industry to improve their practices ○ enforce existing nuisance rules
UNPAVED ROAD DUST	○ education program ○ encourage abandonment

TABLE IV.D-2: PROPOSED INTERIM PM-10 CONTROL STRATEGIES (Cont.)

<u>Source</u>	<u>Control Strategies</u>
WASTE BURNING	
Agricultural Burning	○ strengthen enforcement by APCD ○ establish aerial surveillance program ○ educate agricultural community
Forest and Range	○ increase coordination with appropriate federal or state agencies ○ education program
Incineration	○ strengthen enforcement by APCD ○ strengthen rules
UNPLANNED FIRES	○ improve fire prevention education
ON-ROAD VEHICLES	○ strengthen Transportation Control Measures to reduce vehicle miles travelled ○ participate in valleywide inspection and Maintenance Program
FUEL COMBUSTION	
Oil, Gas, and Other	○ strengthen enforcement by APCD ○ strengthen prohibitions by APCD ○ remove exemptions
Residential	○ enforce New Source Performance Standards for wood stoves ○ education program
Agricultural	○ phase out orchard heaters* ○ enforcement program
INDUSTRIAL	○ strengthen enforcement by APCD
OTHER MOBILE	○ education programs* ○ fuel improvements ○ emission standards
Motorcycles, off-road vehicles, Trains, etc.	

* San Joaquin County designated as Lead Agency.

Source: San Joaquin Valley Basinwide Air Pollution Control Council. Nonattainment Area Plan, PM-10. Draft Interim Report, July 1988.

Endnotes

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3. *ibid.*
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5. State of California Air Resources Board. San Joaquin Valley Growth and Air Quality Impacts, Technical Support Document. September 1988.

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2. San Joaquin County Council of Governments. Transportation Control Measures Technical Analysis Report. October 1981.
3. San Joaquin County Department of Planning and Building Inspection. 1982 Reasonable Further Progress Report. 1983.
4. San Joaquin County Department of Planning and Building Inspection. 1983/1984 Reasonable Further Progress Report.
5. San Joaquin Air Pollution Control District. 1985/1986 Reasonable Further Progress Report.

E. WATER RESOURCES AND QUALITY

1. INTRODUCTION

Water resources in San Joaquin County include rivers, streams, sloughs, marshes, wetlands, channels, harbors, and underground aquifers. The extensive Delta Basin waterway system is one of San Joaquin County's most valuable water resources. Over 700,000 acres of agricultural land and 700 miles of interlacing waterways form the Sacramento-San Joaquin Delta. Four rivers, numerous creeks, and various bodies of water are partially or entirely within the County. The San Joaquin River and its tributaries threading their way through the Delta provide an unusual area of refreshing beauty and sustain many wildlife varieties of commercial and recreational importance. The largest striped bass spawning grounds along the Pacific Coast are located in the Delta. The Stockton Deep Water Channel through the Delta and the San Joaquin River is used as a navigational channel by large commercial ships which stop at the Port of Stockton. The various waterways in the County are used extensively for boating, water-skiing, swimming, hunting, and fishing (an estimated 3 million angler days per year in the Delta).

The County receives its water supply from both underground and surface water. A rapidly expanding population and ensuing economic development are increasing pressures on the County's present water supply. At the same time, water quality is being threatened by commercial and domestic wastes, agricultural discharges, and recreational uses. Locally, water quality maintenance is under the jurisdiction of the San Joaquin County Department of Public Health Services, and at the State level, under the Regional Water Quality Control Board. Groundwater overdraft is causing salt water intrusion and subsidence in some areas.

Management policies governing the approximately 370 miles of rivers and sloughs will be critical in determining the County's character, its pattern of future growth and quality of life. The county maintains a Water Policy Statement to assist in establishing water management policies. The Water Policy Statement is developed by the Advisory Water Commission which serves in an advisory capacity to the Board of Supervisors. This appendix describes the existing water resources, addressing issues of water quality, uses, and current and future sources of supply.

2. HYDROLOGY

Water in San Joaquin County comes from both groundwater aquifers and surface water supplies. Average rainfall ranges from 8 inches per year south of Tracy to 17 inches per year in Lodi. The mean annual precipitation for Stockton is 14.3 inches. Most of the precipitation occurs between December and April, with the summer months virtually rainless. Therefore, groundwater supplies must be recharged and surface water must be retained to supply year-round needs. Most of the rivers entering the County have been impounded; reservoirs generally provide both flood control and a steady supply of water, for which a multitude of agencies negotiate. Table IV.E-1 contains a description of the surface and groundwater resources of the County and their beneficial uses.

3. SURFACE WATER

Rivers and Streams. The major rivers which enter the County from the Sierra Nevada are the San Joaquin, the Mokelumne, the Calaveras, and the Stanislaus (see Figure IV.E-1). The San Joaquin originates in Fresno County, crosses southwestern San Joaquin County and empties through the Delta into Suisun Bay. The other rivers join the San Joaquin at or near the Delta. The Mokelumne originates in Alpine County, crossing the northern portion of the County and forming the County line close to the Delta. The Calaveras, which originates in Calaveras County, crosses the central County. The southern boundary of the County is formed by the Stanislaus, which originates in Alpine County. Several small, generally intermittent streams join these rivers or discharge into the Delta.¹

Water Supply. All of the major rivers in the County have been modified by impoundments or diversion channels. The Pardee Reservoir on the Mokelumne River supplies water to the East Bay Municipal Utility District (in the San Francisco Bay Area), and the Camanche Reservoir on the Mokelumne River supplies water to the North San Joaquin Irrigation District. The New Hogan Reservoir on the Calaveras River supplies water to the Stockton East Water District. The Stanislaus River, with New Melones Reservoir, is a source of future water supply. Stockton East Water District is proposing to use New Melones water by diverting water via canal to the Calaveras River.

The San Joaquin River drains the northern San Joaquin Valley. It serves as a transportation route for ships to pass from the San Francisco Bay to the inland Port of Stockton. A deep water shipping channel is maintained for this purpose. The river also is used for irrigation by adjacent farmers.

Two aqueducts on the west side of the County carry water from the Delta to Southern California. These aqueducts also supply water locally. The California Aqueduct, operated by the California Department of Water Resources, supplies water locally to Musco Olive and Tracy Golf and Country Club. The Delta-Mendota Canal, operated by the U.S. Bureau of Reclamation, serves the City of Tracy as well as several irrigation districts and individuals.*¹ Properties along the rivers also exercise riparian water rights.

At the present time only the cities of Stockton and Tracy use surface water for municipal supplies, although they also pump from the groundwater supply. The Stockton East Water District has built a water treatment plant in southeast Stockton to treat surface water for domestic use. Water from New Hogan Reservoir supplies the plant. The City of Tracy also constructed a water treatment plant in 1979, processing water from the Delta-Mendota Canal.

Further details on water supply in San Joaquin County can be found in the Utilities Chapter of this Document.

*¹ These include the Plainview Water District, Banta-Carbona Irrigation District, West Stanislaus Irrigation District, West Side Irrigation District, Hospital Water District, Teichert Construction and the Arnaudo Brothers.

TABLE IV.E-1: WATER RESOURCES AND THEIR BENEFICIAL USES IN SAN JOAQUIN COUNTY

<u>Water Resources</u>	<u>Beneficial Uses</u>						<u>Operating Agency</u>	<u>Source of Supply</u>	<u>Storage Capacity (Acre-Feet)</u>	<u>Annual Water Use (Acre-Feet)</u>	<u>Users</u>
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>Other</u>					
San Joaquin River	X		X	X	X		-	-	-	N/A	Riparian farmers, Shipping Industry, Irrigation Districts
Mokelumne River	X		X		X		-	-	-	125,000	Irrigation Districts
Comanche Reservoir (1963)	X		X			flood control	EBMUD ¹	Mokelumne River	431,500	N/A	Local residents
Calaveras River	X	X					-	-	-	-	Water Districts
Stanislaus River	X		X		X		-	-	-	318,051	Irrigation Districts
Delta	X		X	X	X	Scenic	-	Multiple Sources	-	N/A	Recreationists, Wildlife, USBR ² , DWR ³ , shipping industry
Delta-Mendota Canal	X	X	X		X		U.S. Bureau of Reclamation	Sacramento River	N/A	144,205	City of Tracy, Irrigation Districts, Commercial, Businesses
California Aqueduct	X	X	X		X		California Department of Water Resources	Sacramento River	N/A	N/A	Commercial, Businesses, Irrigation Districts
Lodi Lake			X				-	Mokelumne River	N/A	-	Local residents
Ground Water	X	X					-	San Joaquin Valley Ground Water Basin	570,000,000 (1972 pumpage)	9,300,000	Private individuals, cities, towns

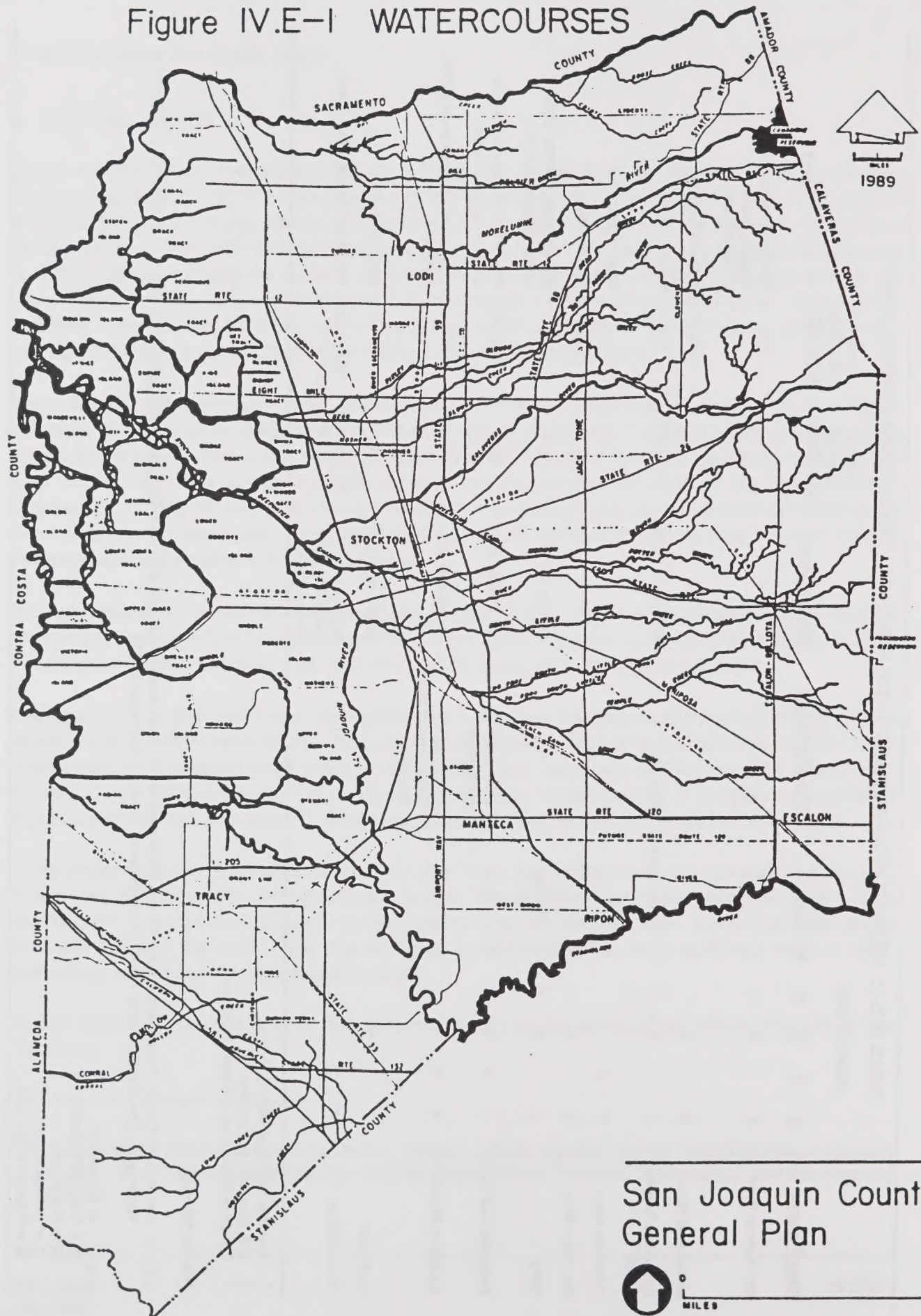
¹ East Bay Municipal Utility District² U.S. Bureau of Reclamation³ California Department of Water Resources

N/A Not Available

Source: San Joaquin County, Department of Planning and Building Inspection, water resource surveys, July 1986; California Waters Atlas, 1979; Interview with EBMUD, U.S. Bureau of Reclamation, San Joaquin County Flood Control Engineer; Stockton -East Water District.

Key: A = Irrigation
 B = Municipal/Industrial
 C = Recreation
 D = Transportation
 E = Estuary/Wildlife Area

Figure IV.E-1 WATERCOURSES



4. GROUNDWATER

In 1980, groundwater accounted for approximately 30% of the water supplies in the County.² The most useful aquifers underlie the upland valley. Very little is found in the foothills of the Sierra Nevada, although some alluvial fans contain a small amount. Groundwater is replenished by rainfall and percolation of surface and irrigation water. Some areas of the County allow more recharge than others. Buildings, pavement, or other impermeable surfaces decrease the area available for water penetration. In the Stockton area, the groundwater supplies have been used faster than they have been replaced, causing saline waters to infiltrate freshwater supplies.

Recharge Requirements. The County conducted a study in 1985 to determine the extent of the groundwater problem.³ This study found that east of the Delta, the groundwater levels declined an average of 1.7 feet per year between 1947 and 1984, for a total drawdown of 64.6 feet. This overdraft caused the saltwater intrusion, which advanced eastward approximately one mile between 1963 and 1983. A groundwater model developed by the study team indicated that if no additional surface water is available for groundwater recharge, water levels will fall as much as 160 feet below sea level and the saline front will move eastward an additional two miles by the year 2020. Continued overdraft could result in subsidence, which would diminish the recharge capabilities of the basin and create or exacerbate flood hazards.

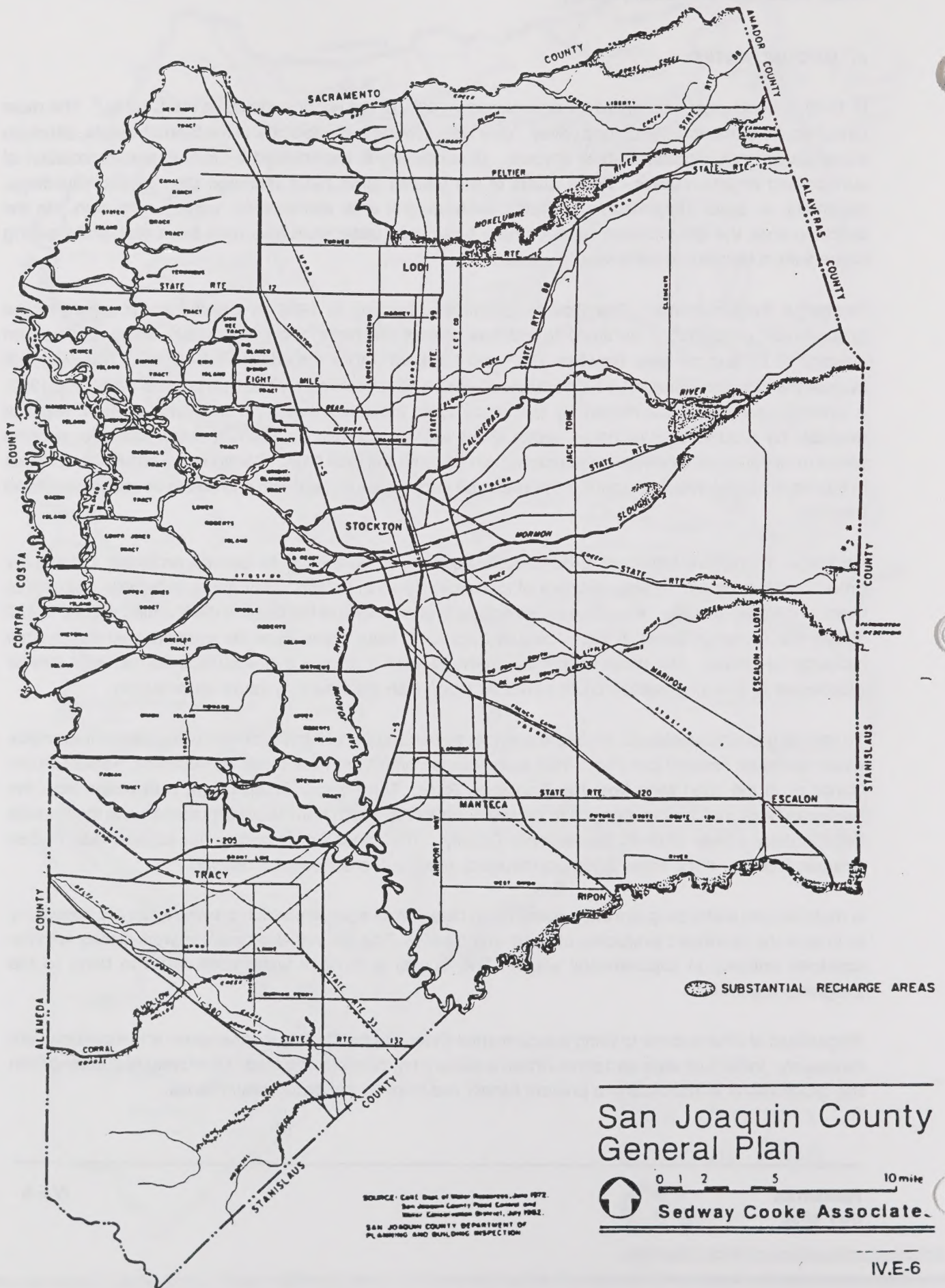
Recharge, or replenishment of groundwater aquifers, is necessary to correct problems caused by groundwater overdraft. A large amount of recharge occurs in upland valley areas, especially adjacent to rivers and larger streams. A small amount occurs in alluvial fans at the base of the foothills. Figure IV.E-2 shows the recharge areas in San Joaquin County. These areas must be protected so that further recharge can occur. Any development which would result in paving over a substantial recharge area or discharges of polluting wastes could seriously jeopardize the County's future water supply.

To restore groundwater levels, it is estimated that approximately 220,000 acre-feet of supplemental surface water would be needed per year. This water could come from New Melones Reservoir, Folsom South Canal, or in the short term from the Calaveras River. The Folsom South Canal, a diversion from the American River, has been proposed to be extended further south from its present terminus at the Rancho Seco nuclear power plant in Sacramento County. The canal would supply the eastern side of San Joaquin County. If the canal is not constructed, other sources would be needed.

A multi-faceted water program and coordination between all agencies which provide water are necessary to ensure the continued availability of water in the future. The County also needs to work closely with the agencies bringing in supplemental water. The County is hiring a water coordinator to bring all the programs together.

Regardless of what is done to bring supplemental water into the County, conservation and monitoring are necessary. Individual wells and some urban areas are not currently metered. Monitoring of pumping from the groundwater is necessary to prevent further reduction in the groundwater levels.

Figure IV.E-2 AQUIFER RECHARGE AREAS



5. UNIQUE WATER RESOURCES

Sacramento-San Joaquin Delta. The Delta is an 1,100 square-mile region of levees, islands, and interconnected waterways located at the confluence of the Sacramento-San Joaquin Rivers. This vast area covers five counties and nine cities, bounded on the east by Interstate 5, on the west by the Sacramento River, on the north by the City of Sacramento, and on the south by Old River. Significant natural resource areas in the Delta are described in the technical appendix on "Vegetation, Fish, and Wildlife Habitat." Surrounding the Delta are major population centers of the San Francisco Bay Area, Sacramento, and Stockton.

The construction of the levees over the past 100-plus years has created 700,000 acres of reclaimed marshland devoted primarily to agriculture and farming. It is one of the richest agricultural areas in the nation. The peat soils produce over \$375 million in crops annually.⁴

The Delta's 700 miles of interconnected waterways is one of the largest bodies of protected water in the western United States. The Delta waterways provide for a vast range of recreational activities which include boating, fishing, swimming, waterskiing, picnicking, and sightseeing. Over 7 million visitors spend an estimated \$73 million on Delta recreation annually, supporting another important sector of the County's economic base.⁵ Despite the extensive reclamation and recreational use, the Delta still provides important fish and wildlife habitat. It is a resting point on the Pacific Flyway, which is a major migratory route for birds from all of North America, including areas as far north as the Canadian Arctic. The Delta requires deliveries of fresh water to help repel saltwater intrusion and to maintain its significant and nationally important wildlife habitat and fishery. In all, the Delta wetlands support 225 species of resident and migratory birds. The waterways also contain 44 species of commercial and sport fish. The number of some species are dwindling as a result of deteriorating water quality and reverse flows drawn to the state water pumps.

Freshwater Marsh. Freshwater marshes occur in low-lying areas and along rivers and lakes. As an ecosystem, a marsh supports a variety of plant and animal life and serves several functions including flood control, enhanced water quality, groundwater recharge, fish nursery, biological productivity, and wildlife habitat.

Marshes are also cultural amenities which provide natural scenery, scientific and educational opportunities, and recreation, such as hunting or nature study. Resident animals and birds found in San Joaquin marshes include the marsh hawk, Virginia rail, great blue heron, mallard, muskrat, and beaver. Cattail, tule, sedges, and rushes are plants commonly found in the marshes.

6. IRRIGATION AND DRAINAGE

Agricultural activities demand a significant portion of the County's water supply. Most crops require summer water. About 30% of the irrigation water comes from groundwater; the rest is from surface supplies. Irrigation water can either be pumped into "spud" ditches adjacent to crops, sprinkled, or delivered by drip irrigation. Of the three, ditch irrigation is most wasteful of water, but it is a simple system to manage. Drip irrigation systems are expensive to install and maintain, but they make the most efficient use of water.

Excess water applied to crops, as well as stormwater, result in runoff. Some may percolate through the soil below root zones and help to recharge groundwater aquifers. However, in areas of impermeable soils, the soils can become waterlogged or excessively saline for crops. Soils in San Joaquin County west of the San Joaquin River have some drainage problems. Tile drains have been installed; however, there are no provisions for disposal of accumulated salts. Treatment of drainage water, especially agricultural runoff, demands attention.

Endnotes

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3. Brown and Caldwell. Eastern San Joaquin County Groundwater Study. October 1985.
4. California Department of Water Resources. Ground Water and Environment - San Joaquin County, proposal for the Cities and County of San Joaquin Advisory Planning Association. June 1972.
5. Herb Matzinger, California Department of Water Resources. Personal communication. July 8, 1986.
6. John Lind, Tracy Office, U.S. Bureau of Reclamation. Personal communication. July 8, 1986.

F. VEGETATION, FISH, AND WILDLIFE HABITAT

1. INTRODUCTION

The County's vegetation and wildlife resources are discussed by distinct geographic areas: the Delta, the southwest foothills, the Sierra Nevada foothills, and the Valley floor. It is also useful to describe the County in terms of vegetative communities, which are associations of plants. The vegetative communities of San Joaquin County are shown in Figure IV.F-1. Within a certain geographic area, a vegetative community and its related topographical features, such as waterways and landforms, comprise habitat for fish and wildlife. Habitat provides the necessary food, water, and shelter for a species. Amphibians, reptiles, birds, and mammals in the County are listed with their related habitats in Table IV.F-1. The discussion below describes the vegetation and wildlife representative of each of the County's geographic areas. Fisheries are discussed separately at the end of this section.

The expansion of cities outward from their current boundaries has caused a reduction in the undisturbed habitat necessary for the survival of wildlife. There are basically three ways to protect wildlife: preserve habitat, provide new habitat, and restore habitat.

Methods of preserving habitat include the programs of such agencies as the Endangered Species Committee, which provides funds for wildlife conservation easements. Also included are government-sponsored mitigation programs in which the development of a habitat area requires the dedication of other habitat area to wildlife or the restoration of a declining habitat area. Methods of providing new habitat include the planting of new vegetation. Restoring habitat can be achieved by returning less productive Delta farmland to its original marshland state. If such means are used, wildlife may be protected even with an expanding County population.

2. THE DELTA

The Delta is the confluence of the Sacramento and San Joaquin rivers, which drain almost the entire Central Valley. Its location between a freshwater and saline environment creates a unique setting that enables a diverse set of species to flourish. The Delta is a major wintering area along the Pacific Flyway, one of North America's primary waterfowl migration routes. The Aleutian Canada Goose, an endangered species on the federal list, is found here, as are the mourning dove and other important game birds. Duck hunting clubs use various islands in San Joaquin County. The Delta also contains important habitat for fish, and serves as the gateway for the anadromous salmonids which migrate to the streams of the Sierra Nevada. In addition, this geographic area supports a moderately sized fur trapping industry, including beaver, mink, deer, muskrat and coyote. The two primary vegetation communities include marshland habitat and riparian habitat. Significant natural resource areas in the Delta are described in Table IV.F-2 and identified in Figure IV.F-2.

Vegetative Communities

- Grassland
- Woodland-Gross
- Chapparal
- Woodland-Chapparal
- Pine-Fir-Chapparal
- Coast Sagebrush
- Riparian Habitat

SOURCES: Department of Fish and Game CALIFORNIA FISH AND WILDLIFE PLAN (Volume 1, January 1946)
State Department of Fish and Game, Field Investigations of areas, Wildlife Botanist 1972

TABLE IV.F-1: AMPHIBIANS, REPTILES, BIRDS, AND MAMMALS IN SAN JOAQUIN COUNTY

Habitat/Feeding Areas

A	Agriculture	G	Grassland
R	Riparian	U	Urban
O	Open Water	X	Other (includes eastern foothills, chaparral, woodland, and sagebrush areas of southwestern County)
W	Oak Woodland		

HABITAT/FEEDING AREA

A	R	O	W	G	U	X
---	---	---	---	---	---	---

AMPHIBIANS

Tiger Salamander (<i>Ambystoma tigrinum</i>)		X	X		X	X
Rough-skinned Newt (<i>Taricha granulosus</i>)						X
California Slender Salamander (<i>Batrachoseps attenuatus</i>)		X		X	X	
Arboreal Salamander (<i>Aneides lugubris</i>)		X				
Western Spadefoot (<i>Scaphiopus hammordi</i>)		X				
Western Toad (<i>Bufo boreas</i>)		X				
Pacific Treefrog (<i>Hyla regilla</i>)	X	X		X	X	X
Red-legged Frog (<i>Rana aurora</i>)		X	X			
Foothill Yellow-legged Frog (<i>Rana boylei</i>)		X	X			
Bullfrog (<i>Rana catesbeiana</i>)	X	X		X	X	

REPTILES

Western Pond Turtle (<i>Clemmys marmorata</i>)		X	X		X	X
Blunt-nosed Leopard Lizard (<i>Gambelia silus</i>) ¹			X	X		X
Western Fence Lizard (<i>Sceloporus occidentalis</i>)				X	X	X
Side-blotched Lizard (<i>Uta stansburiana</i>)				X		X
Coast-horned Lizard (<i>Phrynosoma coronatum</i>)				X		
Western Skink (<i>Eumeces skiltonianus</i>)						
Gilbert Skink (<i>Eumeces gilberti</i>)				X		X
Western Whiptail (<i>Cnemidophorus tigris</i>)				X		X
Southern Alligator Lizard (<i>Gerrhonotus multicarinatus</i>)			X	X		X
Northern Alligator Lizard (<i>Gerrhonotus coeruleus</i>)		X		X		X
California Legless Lizard (<i>Aniella pulchra</i>)			X	X		X
Ringneck Snake (<i>Diadophis punctatus</i>)				X		X
Sharp-tailed Snake (<i>Contia tenuis</i>)						X
Racer (<i>Coluber constrictor</i>)			X	X		X
San Joaquin Coachwhip (<i>Masticophis flagellum ruddocki</i>)						X
Striped Racer (<i>Masticophis lateralis</i>)						X
Glossy Snake (<i>Arizona elegans</i>)						X
Gopher Snake (<i>Pituophis melanoleucus</i>)	X		X	X		X
Common Kingsnake (<i>Lampropeltis getulus</i>)			X	X		X
California Mountain Kingsnake (<i>Lampropeltis zonata</i>)			X			X
Long-nosed Snake (<i>Phinocheilus lecontei</i>)						X
Common Garter Snake (<i>Thamnophis elegans</i>)			X	X		X
Western Terrestrial Garter Snake (<i>Thamnophis elegans</i>)		X		X		X
Giant Garter Snake (<i>Thamnophis couchi gigas</i>)	X					
Western Black-headed Snake (<i>Tantilla planiceps</i>)						X
Night Snake (<i>Hypsiglena torquata</i>)						X
Western Rattlesnake (<i>Crotalus viridis</i>)						X

BIRDS

Pied-billed Grebe (<i>Podilymbus podiceps</i>)			X			
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TABLE IV.F-1: AMPHIBIANS, REPTILES, BIRDS, AND MAMMALS IN SAN JOAQUIN COUNTY (Cont.)

Habitat/Feeding Areas

A	Agriculture	G	Grassland
R	Riparian	U	Urban
O	Open Water	X	Other (includes eastern foothills, chaparral, woodland, and sagebrush areas of southwestern County)
W	Oak Woodland		

	HABITAT/FEEDING AREA						
	A	R	O	W	G	U	X
Western Grebe (<i>Aechmophorus occidentalis</i>)			X				
American Bittern (<i>Botaurus lentiginosus</i>)		X	X				
Great Blue Heron (<i>Ardea herodias</i>)	X	X	X	X			
Great Egret (<i>Casmerodius albus</i>)	X		X	X			
Green-backed Heron (<i>Butorides striatus</i>)		X	X				
Black-crowned Night Heron (<i>Nycticorax nycticorax</i>)	X	X	X	X			
Tundra Swan (<i>Cygnus columbianus</i>)	X	X	X				
Greater White-fronted Goose (<i>Anser albifrons</i>)	X	X	X				
Snow Goose (<i>Chen rossii</i>)	X	X	X				
Canada Goose (<i>Branta Canadensis</i>)	X	X	X				
Wood Duck (<i>Aix sponsa</i>)	X	X	X				
Green-winged Teal (<i>Anas crecca</i>)	X	X	X				
Mallard (<i>Anas platyrhynchos</i>)	X	X	X				
Northern Pintail (<i>Anas acuta</i>)	X	X	X				
Cinnamon Teal (<i>Anas cyanoptera</i>)	X	X	X				
Northern Shoveler (<i>Anas clypeata</i>)	X	X	X				
Gadwall (<i>Anas strepera</i>)	X	X	X				
American Widgeon (<i>Anas americana</i>)	X	X	X				
Canvasback (<i>Aythya valisineria</i>)	X	X	X				
Redhead (<i>Aythya americana</i>)	X	X	X				
Ring-necked Duck (<i>Aythya cellaris</i>)	X	X	X				
Lesser Scaup (<i>Aythya affinis</i>)	X	X	X				
Common Goldeneye (<i>Bucephala clangula</i>)	X	X	X				
Bufflehead (<i>Bucephala albeola</i>)	X	X	X				
Ruddy Duck (<i>Oxyura jamaicensis</i>)	X	X	X				
Turkey Vulture (<i>Cathartes aura</i>)	X			X	X		
Black-shouldered Kite (<i>Elanus caeruleus</i>)	X	X		X			
Bald Eagle (<i>Haliaeetus leucocephalus</i>)			X	X	X	X	
Northern Harrier (<i>Circus cyaneus</i>)	X	X	X		X		
Sharp-shinned Hawk (<i>Accipiter striatus</i>)	X	X		X	X		
Cooper's Hawk (<i>Accipiter cooperii</i>)				X	X		X
Red-shouldered Hawk (<i>Buteo lineatus</i>)	X				X		X
Swainson's Hawk (<i>Buteo swainsoni</i>)	X		X	X			
Red-tailed Hawk (<i>Buteo jamaicensis</i>)	X	X		X	X		
Rough-legged Hawk (<i>Buteo lagopus</i>)	X				X		
Golden Eagle (<i>Aquila chrysaetos</i>)							X
American Kestrel (<i>Falco sparverius</i>)	X				X		
Merlin (<i>Falco columbarius</i>)	X				X		
Prairie Falcon (<i>Falco mexicanus</i>)							X
Ring-necked Pheasant (<i>Phasianus cochicus</i>)	X	X					
California Quail (<i>Callipepla californicus</i>)	X	X		X	X		X

TABLE IV.F-1: AMPHIBIANS, REPTILES, BIRDS, AND MAMMALS IN SAN JOAQUIN COUNTY (Cont.)

Habitat/Feeding Areas

A	Agriculture	G	Grassland
R	Riparian	U	Urban
O	Open Water	X	Other (includes eastern foothills, chaparral, woodland, and sagebrush areas of southwestern County)
W	Oak Woodland		

	HABITAT/FEEDING AREA						
	A	R	O	W	G	U	X
California Black Rail (<i>Laterallus jamaicensis coturniculus</i>)		X					
Common Morhen (<i>Galinula chloropus</i>)		X	X				
American Coot (<i>Fulica americana</i>)	X	X	X				
Greater Sandhill Crane (<i>Grus canadensis tabida</i>)	X	X	X				
Killdeer (<i>Chaeradrius vociferous</i>)	X	X	X			X	
American Avocet (<i>Recurvirostra americana</i>)		X	X				
Long-billed Curlew (<i>Numenius americanus</i>)	X						
Marbled Godwit (<i>Limosa fedoa</i>)		X	X		X		
Long-billed Dowitcher (<i>Limodromus scolopaccus</i>)			X				
Common Snipe (<i>Galinago galinago</i>)	X	X	X				
Bonaparte's Gull (<i>Larus philadelphia</i>)			X				
Ring-billed Gull (<i>Larus delawarensis</i>)			X				
California Gull (<i>Larus californicus</i>)			X				
Caspian Tern (<i>Sterna caspia</i>)		X	X				
Rock Dove (<i>Columba livia</i>)	X					X	X
Band-tailed Pigeon (<i>Columba fasciata</i>)				X			X
Mourning Dove (<i>Zenaida macroura</i>)	X	X		X	X	X	X
Greater Roadrunner (<i>Geococcyx californianus</i>)					X		X
Common Barn Owl (<i>Tyto alba</i>)				X	X		X
Western Screech Owl (<i>Otus kennicottii</i>)				X	X		X
Great Horned Owl (<i>Bubo virginianus</i>)		X		X			X
Burrowing Owl (<i>Athene cunicularia</i>)	X				X		
Short-eared Owl (<i>Asio falmeus</i>)	X				X		
White-throated Swift (<i>Aeronautes saxatalis</i>)							X
Anna's Hummingbird (<i>Calypse anna</i>)				X		X	X
Belted Kingfisher (<i>Ceryle alcyon</i>)		X		X			
Lewis' Woodpecker (<i>Melanerpes lewis</i>)				X	X		X
Acorn Woodpecker (<i>Melanerpes formicivorus</i>)				X	X		X
Downy Woodpecker (<i>Picoides pubescens</i>)				X	X		X
Northern Flicker (<i>Colaptes auratus</i>)				X	X		X
Western Flycatcher (<i>Empidonax difficilis</i>)		X		X			X
Black Phoebe (<i>Sayornis nigricans</i>)		X			X		X
Say's Phoebe (<i>Sayornis saya</i>)					X		X
Western Kingbird (<i>Tyrannus verticalis</i>)			X	X			X
Horned Lark (<i>Eremophila alpestris</i>)	X	X		X	X	X	X
Nuttall's Woodpecker (<i>Picoides nuttallii</i>)				X	X		X
Tree Swallow (<i>Tachycineta bicolor</i>)		X		X			X
Northern Rough-winged Swallow (<i>Steigidopteryx serripennis</i>)		X					
Cliff Swallow (<i>Hirundo pyrrhonota</i>)	X	X		X			X
Barn Swallow (<i>Hirundo rustica</i>)	X	X		X	X		X
Scrub Jay (<i>Aphelocoma coerulescens</i>)				X		X	X

TABLE IV.F-1: AMPHIBIANS, REPTILES, BIRDS, AND MAMMALS IN SAN JOAQUIN COUNTY (Cont.)

Habitat/Feeding Areas

A	Agriculture	G	Grassland
R	Riparian	U	Urban
O	Open Water	X	Other (includes eastern foothills, chaparral, woodland, and sagebrush areas of southwestern County)
W	Oak Woodland		

	HABITAT/FEEDING AREA						
	A	R	O	W	G	U	X
Yellow-billed Magpie (<i>Pica nuttalli</i>)				X	X		X
American Crow (<i>Corvus brachyrhynchos</i>)	X	X		X	X		
Common Raven (<i>Corvus corax</i>)							X
Plain Titmouse (<i>Parus inornatus</i>)				X	X		X
Bushtit (<i>Psaltirparus minimus</i>)				X	X		X
White-breasted Nuthatch (<i>Sittacarolinensis</i>)				X	X		X
Benwick's Wren (<i>Thryomanes bewickii</i>)				X	X		X
House Wren (<i>Troglodytes aedon</i>)				X			
Winter Wren (<i>Troglodytes troglodytes</i>)		X		X			
Marsh Wren (<i>Cistaphorus palustris</i>)		X	X				
Ruby-crowned Kinglet (<i>Rogulus calendula</i>)		X		X	X	X	X
Western Bluebird (<i>Sialia mexicana</i>)					X		X
Hermit Thrush (<i>Catharus guttatus</i>)				X			X
American Robin (<i>Turdus migratorius</i>)	X	X		X	X	X	X
Varied Thrush (<i>Ixoreus naevius</i>)		X		X		X	X
Wrentit (<i>Chamaca fasciata</i>)				X			X
Northern Mockingbird (<i>Mimus polyglottos</i>)				X		X	X
California Thrasher (<i>Toxostoma redivivum</i>)				X	X		X
Water Pipit (<i>Antus spinoletta</i>)		X					
Cedar Waxwing (<i>Bombycilla cedrorum</i>)				X		X	X
Phainopepla (<i>Phainopepla nitens</i>)				X			X
Loggerhead Shrike (<i>Lanius ludovicianus</i>)	X						
European Starling (<i>Sturnus vulgaris</i>)	X			X	X	X	X
Yellow Warbler (<i>Dendroica petechia</i>)				X			
Yellow-rumped Warbler (<i>Dendroica coronata</i>)		X		X	X	X	X
Wilson's Warbler (<i>Wilsonia pusilla</i>)				X			
Black-headed Grosbeak (<i>Pheucticus melanocephalus</i>)		X	X			X	X
Luzili Bunting (<i>Passerina amoena</i>)		X					X
Rufous-sided Towhee (<i>Pipilo erythrophthalmus</i>)		X		X	X		X
Brown Towhee (<i>Pipilo fuscus</i>)				X			X
Lark Sparrow (<i>Chondestes grammacus</i>)					X		X
Savannah Sparrow (<i>Passerculus sandwichensis</i>)					X		
Fox Sparrow (<i>Passerella iliaca</i>)				X	X	X	X
Song Sparrow (<i>Melospiza melodia</i>)		X		X	X	X	X
Golden-crowned Sparrow (<i>Zonotrichia atricapilla</i>)				X	X	X	X
White-crowned Sparrow (<i>Zonotrichia leucophrys</i>)				X		X	X
Dark-eyed Junco (<i>Junco hyemalis</i>)				X		X	X
Red-winged Blackbird (<i>Agelaius phoeniceus</i>)	X	X	X				
Tri-colored Blackbird (<i>Agelaius tricolor</i>)	X	X	X				
Western Meadowlark (<i>Sturnella neglecta</i>)	X				X		
Yellow-headed Blackbird (<i>Xanthocephalus xanthocephalus</i>)	X	X	X				

TABLE IV.F-1: AMPHIBIANS, REPTILES, BIRDS, AND MAMMALS IN SAN JOAQUIN COUNTY (Cont.)

Habitat/Feeding Areas

A	Agriculture	G	Grassland
R	Riparian	U	Urban
O	Open Water	X	Other (includes eastern foothills, chaparral, woodland, and sagebrush areas of southwestern County)
W	Oak Woodland		

	HABITAT/FEEDING AREA						
	A	R	O	W	G	U	X
Brewer's Blackbird (<i>Euphagus cyanocephalus</i>)	X	X		X	X	X	X
Brown-headed Cowbird (<i>Molothrus ater</i>)		X		X			
Bullock's Oriole (<i>Icterus bullockii</i>)		X			X		X
House Finch (<i>Carpodacus mexicanus</i>)				X		X	X
American Goldfinch (<i>Carduelis tristis</i>)				X		X	X
House Sparrow (<i>Passer domesticus</i>)	X					X	
MAMMALS							
Virginia Opossum (<i>Didelphis virginiana</i>)	X	X		X			X
Ornate Shrew (<i>Sorex ornatus</i>)				X			X
Broad-footed mole (<i>Scapanus latimanus</i>)				X	X		X
California Myotis (<i>Myotis Californicus</i>)	X	X		X	X		X
Western Pipistrelle (<i>Pipistrellus hesperus</i>)	X						X
Big Brown Bat (<i>Eptesicus fuscus</i>)	X			X			X
Brazilian Free-tailed Bat (<i>Tadarida brasiliensis</i>)	X			X		X	X
Brush Rabbit (<i>Sylvilagus bachmani</i>)				X			X
Desert Cottontail (<i>Sylvilagus auduboni</i>)	X			X	X		X
Black-tailed hare (<i>Lepus Californicus</i>)	X				X		X
California Ground Squirrel (<i>Spermophilus beecheyi</i>)	X			X	X		X
Western Gray Squirrel (<i>Sciurus griseus</i>)		X		X			
Botta's Pocket Gopher (<i>Thomomys bottae</i>)	X				X	X	X
San Joaquin Pocket Mouse (<i>Perognathus inornatus</i>)				X	X		X
Heermann's Kangaroo Rat (<i>Dipodomys heermanni</i>)							X
Beaver (<i>Castor canadensis</i>)		X					
Western Harvest Mouse (<i>Reithrodontomys megalotis</i>)	X	X		X	X		X
California Mouse (<i>Peromyscus californicus</i>)				X			X
Deer Mouse (<i>Peromyscus maniculatus</i>)	X	X		X	X	X	X
Brush Mouse (<i>Peromyscus boylii</i>)				X			X
Pinyon Mouse (<i>Peromyscus truei</i>)				X			X
Desert Woodrat (<i>Neotoma lepida</i>)							X
Dusky-footed Woodrat (<i>Neotoma fuscipes</i>)				X			X
California Vole (<i>Nicrotis californicus</i>)	X					X	
Muskrat (<i>Ondatra zibethicus</i>)		X					
Black Rat (<i>Rattus rattus</i>)		X				X	
Norway Rat (<i>Rattus norvegicus</i>)	X					X	
House Mouse (<i>Mus musculus</i>)	X				X	X	X
Coyote (<i>Canis latrans</i>)	X			X	X		X
San Joaquin Kit Fox (<i>Vulpes macrotis mutica</i>)	X				X		X
Gray Fox (<i>Urocyon cinereoargenteus</i>)	X	X		X			X
Raccoon (<i>Procyon lotor</i>)	X	X		X	X		X
Long-tailed Weasel (<i>Mustela frenata</i>)	X			X	X		X

TABLE IV.F-1: AMPHIBIANS, REPTILES, BIRDS, AND MAMMALS IN SAN JOAQUIN COUNTY (Cont.)

Habitat / Occupying Areas	
A	Agriculture
R	Riparian
O	Open Water
W	Oak Woodland
G	Grassland
U	Urban
X	Other (includes eastern foothills, chaparral, woodland, and sagebrush areas of southwestern County)

	HABITAT/FEEDING AREA						
	A	R	O	W	G	U	X
Mink (<i>Mustela vison</i>)		X					X
Badger (<i>Taxidea taxus</i>)	X			X	X		X
Western Spotted Skunk (<i>Spilogale gracilis</i>)	X	X		X	X		X
Striped Skunk (<i>Mephitis mephitis</i>)	X	X		X	X		X
River Otter (<i>Lutra canadensis</i>)		X	X				
Bobcat (<i>Lynx rufus</i>)		X		X			X
California Sea Lion (<i>Zalophus californianus</i>) ²				X			
Harbor Seal (<i>Phoca vitulina</i>) ²				X			
Mule Deer (<i>Odocoileus hemionus</i>)	X	X		X			X

- 1 Historically, San Joaquin County supported the blunt-nosed leopard lizard. This species may still be found in the Corral Hollow Ecological Reserve,, however, the latest At the Crossroads indicates that agricultural and urban developments may have extirpated this species from the County.
- 2 The Harbor Seal and California Sea Lion are infrequent visitors to San Joaquin County. They are occasionally seen in the Delta, on the western edge of the County. Harbor Seals have been sighted in Stockton's Deepwater Channel in the Turning Basin.

Sources:

1. San Joaquin County Council of Governments. Conservation Element, June 1973. Appendix 1. Updates by Frank Werenette, California Department of Fish and Game, January 1984.
2. List of Amphibians and Reptiles occurring in Corral Hollow, (1974), supplied by Dan Gifford, unit manager of the Corral Hollow Ecological Reserve, California Department of Fish and Game.
3. Scientific and common names are based on those published in the January-February 1983 issue of Outdoor California in the article entitled "A List of Amphibians, Reptiles, Birds and Mammals of California," edited by William F. Laudenslayer, Jr., and William F. Grenfell, Jr. (pp 5-14).

TABLE IV.F-2:
SIGNIFICANT NATURAL RESOURCE AREAS IN THE DELTA

<u>Natural Resource Area</u>	<u>Description of Area</u>
1. Old River Island Area	Along southern reaches of Old River, upper Tom Paine Slough; Upland Islands; well-developed oak riparian vegetation along steep; unriprapped banks; oak savannah remnants in places; deep mineral soils very different from riparian vegetation elsewhere in Delta; very scenic; archaeological site.
2. Upper Middle River Islands	Well-developed riparian habitat, extending beyond levees in a few places; surrounding agricultural habitat includes ruderal lands and orchards which provide good cover; habitat for Freshwater Marsh and California Black Rail, California Hibiscus, Tule Pea; archaeological site.
3. Trapper Slough	Closed-off channel, now a freshwater marsh with a heavy growth of water hyacinth and yellow water weed; muskrats, a highly productive fishery, large turtles, and a wide variety of birds.
4. Stockton Deepwater Channel Islands	Diverse mix of upland and march habitats; habitat for Black Rail; California Hibiscus; freshwater marsh with open water valuable to wintering water fowl; designated natural area by Delta Master Recreation Plan. a. Mandeville Tip b. Venice Cut c. Wards Island d. Little Venice Island e. Tinsley Island f. Fern Island, South and North g. Columbia Cut Island at Main Channel h. South Headreach Island, downstream portion i. North Headreach Island j. North Tule Island k. South Spud and South Hog Island l. North Spud and North Hog Island m. Acker Island, upstream portion n. Walter's Island o. Morrison Island, downstream portion
5. Disappointment Slough Islands	Mix of upland and marsh habitats; one of the most scenic sloughs; young riparian trees; freshwater marsh; California Hibiscus.

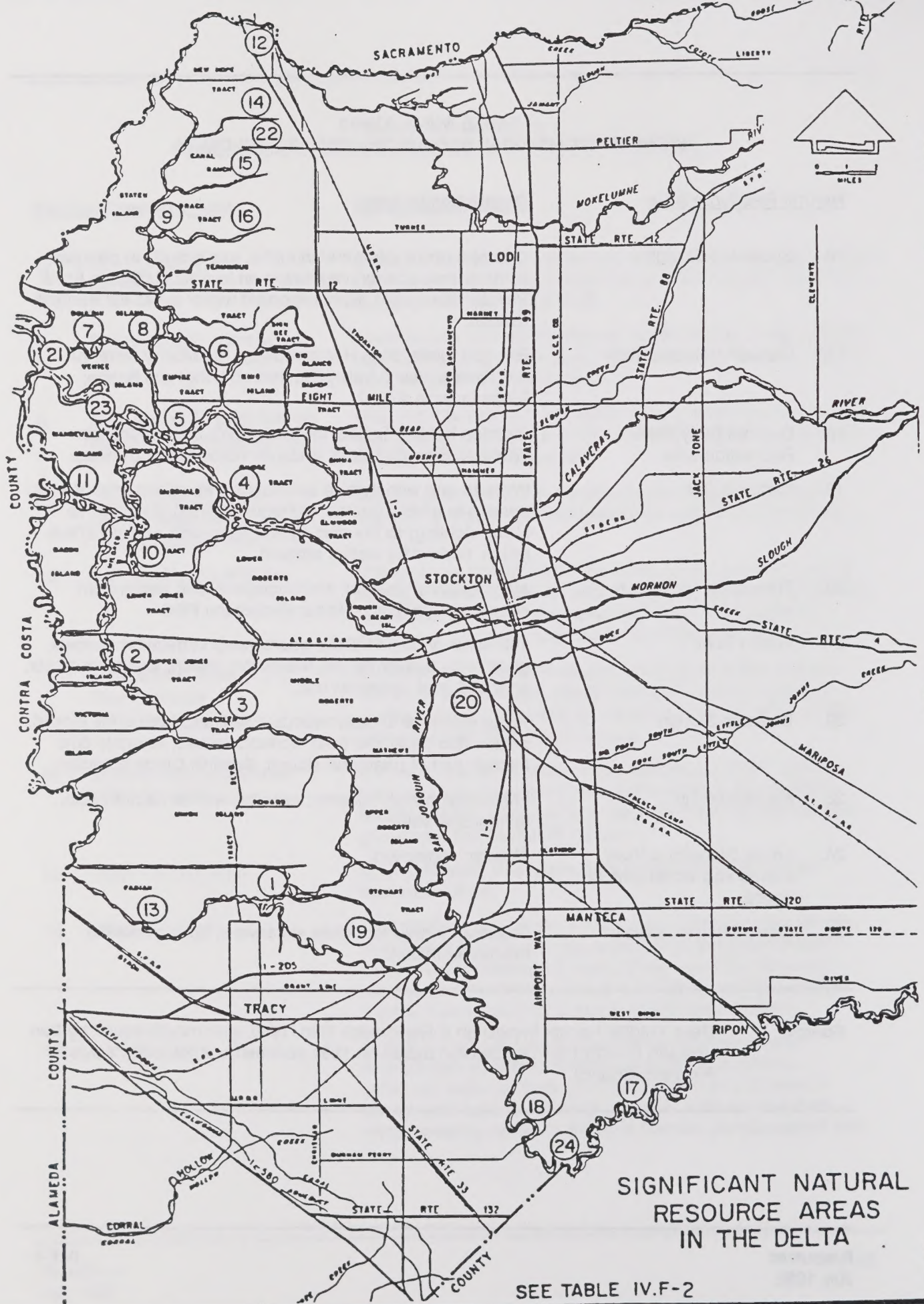
TABLE IV.F-2: (Cont.)
SIGNIFICANT NATURAL RESOURCE AREAS IN THE DELTA

<u>Natural Resource Area</u>	<u>Description of Area</u>
6. White Slough and Marsh Islands;	Channel tule islands; freshwater marsh; some riparian habitat; very scenic. Two rare animals have been sighted here (Giant Garter Snake and black Rail).
7. Potato Slough Islands;	Channel tule islands; freshwater marsh; some riparian habitat; very scenic; two rare animals have been sighted here (Giant Garter Snake and Black Rail).
8. Little Potato Slough Islands (except Grindstone Joe's)	Channel tule islands; freshwater marsh; some riparian habitat; very scenic; two rare animals have been sighted here (Giant Garter Snake and Black Rail).
9. Island, South Fork of Mokelumne River at Mouth of Sycamore Slough.	Some higher ground in center; diverse vegetation; may be remnant example of an original Delta vegetation community.
10. Latham Slough Islands	Channel tule islands with freshwater marsh as well as some with riparian shrub-brush and woodland; shrub-brush riparian habitat along levees; California Hibiscus along southern reaches of Old River and upper Tom Paine Slough
11. Connection Slough, Old River complex	A diverse mix of upland habitat, agricultural lands, riparian trees and shrub-brush, marsh, and tule islands; excellent wildlife habitat particularly for raptorial birds, songbirds, and game species; California Hibiscus.
12. Mokelumne-Consumnes River complex	A diverse mix of upland habitat, agricultural lands, riparian trees and shrub-brush, marsh, and tule islands; excellent wildlife habitat, particularly for raptorial birds, songbirds, and game species; California Hibiscus.
13. Island in Old River	Upland habitat; designated natural area by Delta Master Recreation Plan.
14. Beaver Slough	The northernmost of the 3 major dead-end sloughs, with the most extensive riparian vegetation; east of Blossom Road trees are well-developed; many snags in water; east end inaccessible to all but small, slow boats, preserving wildlife habitat; surrounded by Sandhill Crane winter habitat.
15. Hog Slough	One of 3 major dead-end sloughs with unique aquatic characteristics; a plant species of concern (California Hibiscus) reported from here; seasonal marsh at head of slough and agricultural fields on either side are important winter roosting areas for Sandhill Cranes; archaeological site.

TABLE IV.F-2: (Cont.)
SIGNIFICANT NATURAL RESOURCE AREAS IN THE DELTA

<u>Natural Resource Area</u>	<u>Description of Area</u>
16. Sycamore Slough	One of 3 major dead-end sloughs; tule islands in channel; some sparse riparian vegetation on levees; California Black Rail; lands on both sides important winter areas for Sandhill Cranes.
17. Caswell Memorial Park	Riparian forest; Blue Heron rookery; Elderberry savanna; Swainson's Hawk; Valley Elderberry; Longhorn Beetle; Riparian Bush Rabbit.
18. Durham Ferry State Recreation Area	Riparian habitat; habitat for Swainson's Hawk, Riparian Woodrat, Slough Thistle, Western Yellow-billed Cuckoo.
19. Paradise Cut	Western end with mature oak riparian woodland; cottonwood riparian in middle stretch, to Paradise Road; Swainson's Hawk sighting; to the east, levees lined with riparian shrub-brush, flanked by walnut orchard.
20. French Camp Slough	Mature riparian habitat; archaeological site; designated natural area by Delta Master Recreation Plan.
21. Potato Point	100 acres of original Delta backswamp vegetation; willows, giant reed, beaver ponds, freshwater marsh; extensive raptor, songbird, and waterfowl use.
22. Blossom Slough	Large willows and cottonwoods; tule lined; both ends closed; private and protected from recreational use; valuable bird habitat; part of dead-end slough, Sandhill Crane complex.
23. Mandeville Tip	Freshwater marsh complex; valuable wildlife habitat; also, recreational value.
24. Lower Stanislaus River Berms and Water-side of Levees	Riparian vegetation.
25. Other Channel Islands	Scattered throughout Delta waterways; riparian habitat freshwater marsh.

Source: Delta Wildlife Habitat Protection & Restoration Plan, 1980, with modifications by San Joaquin County Planning Division based on 1984 comments of the Delta Advisory Planning Council.



SIGNIFICANT NATURAL RESOURCE AREAS IN THE DELTA

SEE TABLE IV.F-2

Delta Marshland Habitat. In its natural state, the Delta would be a vast tidal marsh. However, after more than 100 years of reclamation activities, over 80% has been developed for agricultural use. The remaining marshland includes such areas as Trapper Slough, which is west of Stockton and adjacent to Highway 4. The importance of marshland habitat is evidenced by the great numbers and diversity of wildlife it attracts.

The Delta marshland serves as habitat for many rare and endangered species. Ten plant species in the Delta have been identified by FWS, the CDFG, or the Native Plant Society as being rare or endangered. The CDFG has identified one rare animal species and two rare bird species: the giant garter snake, the black rail, and the greater sandhill crane. The former El Dorado Duck Club on Woodbridge Road, which consists of 150 acres of mainly shallow ponds, is an ecological reserve managed by the CDFG for the purpose of preserving the greater sandhill crane. Possibly one-third of the total population of sandhill cranes roosts at this reserve.

Delta marshes provide one of the nutrient sources for the Delta and San Francisco Bay ecosystems. The nutrients are derived from dead plant tissues which are flushed out to San Francisco Bay. Delta marshes also serve as areas for aquifer recharge.

When marshland habitat is converted to agricultural use, it may occasionally support many of the same species but not necessarily in the same intensity. Furthermore, agricultural uses do not provide the critical wetlands habitat that Delta marshland provides. Thus, marshland conversion should be discouraged, while marshland restoration should be encouraged.

Delta Riparian Habitat. The Delta riparian habitat is composed of vegetative communities along riverbanks and levees. Riparian habitat occurs along natural watercourses throughout San Joaquin County. Although this section refers specifically to the riparian habitat found in the Delta, the issues apply generally along the County's major rivers.

Riparian habitat is of excellent value to birds, fish and mammals because it offers ample food and cover. The presence of water allows for rapid and more intense plant growth and a higher plant diversity than is available in most vegetative communities. Although the Delta system historically contained some natural levees formed by the rivers, man has constructed more and higher levees throughout the Central Valley and Delta for flood control. Vegetation grows on both the natural and man-made levees; however, man-made levees tend to have much younger, immature vegetation.

Levees are maintained to prevent periodic flooding. While traditional flood control practices involved clearing levees and watercourses of all vegetation, it is now recognized that adequately vegetated levees, planted with groundcover and intermittent trees and shrubs may enhance flood control by providing protection for the levee from the erosive effects of wind or boat-driven waves and rain.

Potato Point is a privately owned area of ecological importance which was created when a levee break scoured a deep freshwater marsh around a lake. It is one of the few remaining areas of reasonably mature riparian vegetation.

In the Delta channel islands, the vegetation consists primarily of tules, small willows and other trees. These islands provide preferred habitat for many species of wildlife because of their relative isolation. They also have aesthetic value. Dredging to improve and maintain the levees has reduced the size of many of these vital channel islands.

3. SOUTHWEST FOOTHILLS

The foothills in the southwest portion of the County contain a desert-like habitat of chaparral, grassland, and woodlands. This habitat is significant because it is the northernmost range of this type of vegetation in the state, thus providing an excellent site for research. Mule deer, the only big game species in the County, inhabit the region. The foothills and grasslands are also home to a federal endangered and state rare species, the San Joaquin kit fox. Also present is a state endangered plant, the large-flowered fiddleneck. Other protected species or species of special importance include the fragrant fritillary, golden eagle, black-shouldered kite, prairie falcon, San Joaquin coachwhip, coast horned lizard, striped racer, foothill yellow-legged frog, and red-legged frog. The Corral Hollow Ecological Reserve, managed by the CDFG, was created to preserve the red-legged frog and the unique high desert habitat.

4. SIERRA NEVADA FOOTHILLS

The eastern portion of the County is covered by grassland interspersed with valley oak woodlands. Although most of the oaks have since been cleared, a few individual trees and small groves can still be found. The foothills also include some riparian habitat, found along both the Mokelumne and Stanislaus Rivers, and along the Calaveras River, mainly upstream of Bellota. Many species of plants and animals thrive in the riparian habitat, including deer. The grasslands are especially valuable to reptiles and raptors. It may be possible to find the endangered golden eagle in this area.

5. VALLEY FLOOR

The Valley floor contains some of the most fertile agricultural soils in the nation. Although most agricultural operations are disruptive to native plants and animals, some crops do provide food to wildlife. Along the edges of fields and orchards, dense protective cover for wildlife and food for birds is provided where stands of weeds, blackberry brambles and brush are left undisturbed. The burrowing owl, which may soon be classified as rare, is found in agricultural and open areas of the Valley floor. Also present are migrating waterfowl, resident game birds, small mammals, and a multitude of rodents.

Valley oaks, which add variety to the often flat landscape, are found both singly and in groves. Their numbers have diminished due to agricultural clearing and development. The locations of significant oak groves are found in Figure IV.F-3. Oak Grove Park, managed by San Joaquin County, preserves a significant stand of oaks between Stockton and Lodi. Other protected areas on the Valley floor include the Lodi Lake Nature Area; Duck Creek Hollow, which is a conservation easement to the CDFG to preserve riparian land along the Calaveras River; Acker Island, a channel island of good riparian habitat; and Rhode Island, a freshwater marsh.

6. SENSITIVE SPECIES

Vegetation, fish, and wildlife have commercial, recreational, educational and aesthetic values and play critical roles in the food chain. Various species of plants, wildlife and fish have become extinct due to human influences, coupled with an insufficient concern for conservation. For this reason, the United States Congress passed the Endangered Species Act in 1973. The State enacted a parallel act, the California Endangered Species Act. These two acts, in conjunction with the California Environmental Quality Act and the National Environmental Policy Act, help to protect the ecosystems upon which endangered and threatened species depend.

The federal act is implemented by the U.S. Fish and Wildlife Service (FWS), while the California Department of Fish and Game (CDFG) implements the State Act. The two agencies sometimes coordinate protection programs or project reviews, and both publish lists of species which satisfy criteria classifying them as endangered. Species that have been proposed for listing but have not yet been accepted are classified as candidate species.

Generally, the term endangered refers to a species which is in danger of becoming extinct throughout all or a significant portion of its range, while a threatened (Federal, State) or rare (State) species is one that could become endangered in the foreseeable future. Endangered plants and wildlife in the County are shown in Table IV.F-3.

Included on the list of endangered plants and wildlife are some species which are dependent upon habitat in San Joaquin County for their survival. These species are the most sensitive to changes in land use in the County. One such species is the Swainson's hawk. Special consideration for the habitats of such species is critical to their survival.

Figure IV.F-3 SIGNIFICANT OAK GROVES

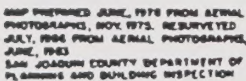


TABLE IV.F-3:
ENDANGERED, RARE, AND THREATENED SPECIES IN SAN JOAQUIN COUNTY, JULY 1986;
AMENDED DECEMBER 1988

<u>Species</u>	<u>Classification</u>
INSECTS	
Valley Elderberry Longhorn Beetle (<i>Desmocerus Californicus dimorphus</i>)	Federal Threatened
REPTILES	
Blunt-Nosed Leopard Lizard (<i>Gambelia silus</i>) ²	State and Federal Endangered
Giant Garter Snake (<i>Thamnophis couchi gigas</i>)	State Threatened
BIRDS	
Aleutian Canada Goose (<i>Branta canadensis leucopareia</i>)	Federal Endangered
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	State and Federal Endangered
Swainson's Hawk (<i>Buteo swainsoni</i>)	State Threatened
California Black Rail (<i>Laterallus jamaicensis coturniculus</i>)	State Threatened
Greater Sandhill Crane (<i>Grus canadensis tabida</i>)	State Threatened
Western Yellow Billed Cuckoo (<i>Coccyzus americanus occidentalis</i>)	State Endangered; Federal Candidate
MAMMALS	
San Joaquin Kit Fox (<i>Vulpes macrotis mutica</i>)	State Threatened; Federal Endangered
PLANTS	
California Hibiscus (<i>Hibiscus Californicus</i>)	Federal Candidate; CNPS List 2
Large-flowered Fiddleneck (<i>Amsinckia grandiflora</i> Kleeb. ex Gray)	State and Federal Endangered; CNPS List 1
Masons Lilaepsis (<i>Lilaepsis Masonii</i>)	State Rare; Federal Candidate; CNPS List 2
Suisun Marsh Aster (<i>Aster chilensis</i> Nees var, <i>Lentus</i> (Greene) Jeps)	Federal Candidate; CNPS List 1
Slough Thistle (<i>Cirsium crassicaule</i> (Greene) Jeps.)	Federal Candidate; CNPS List 1
Delta coyote thistle (<i>Eryngium racemosum</i> Jeps.)	Federal Candidate; State Endangered; CNPS LIST 1
Diamond-Petaled California Poppy (<i>Eschscholzia rhombipetala</i> Greene)	Federal Candidate; CNPS LIST 1
Mason's Lilaepsis (<i>Lilaepsis masonii</i> Math. & Const.)	Federal Candidate; State Rare; CNPS List 1
Caper-fruited Tropicocarpum (<i>Tropicocarpum caparideum</i> Greene)	Federal Candidate; CNPS LIST 1
Greene's Orcuttia (<i>Tuctoria greenii</i> (Vasey) (J.Reeder)	State Rare; CNPS List 1

TABLE IV.F-3: (Cont.)
ENDANGERED, RARE, AND THREATENED SPECIES IN SAN JOAQUIN COUNTY, JULY 1986;
AMENDED DECEMBER 1988

<u>Species</u>	<u>Classification</u>
Ferris' Birds-beak (<i>Cordylanthus palmatus</i>)	State and Federal endangered; CNPS List 1
Hoover's Cryptantha (<i>Crythantha hooveri</i>)	CNPS List 4
Gypsum Loving Larkspur (<i>Delphineum gypsophilum</i>)	CNPS List 4
California Hibiscus (<i>Hibiscus californicus</i>)	Federal candidate; CNPS List 1
Greene's Tuctoria (<i>Tuctoria greenei</i>)	Federal candidate; State rare CNPS List 1

- ¹ Plants listed as Rare or Endangered by the State Fish and Game Commission have been recommended for such classification by the California Native Plant Society (CNPS). Plants appearing on the CNPS List 2 meet the Rare and Endangered Species criteria as defined by the State Legislature under the Native Plant Protection Act. Such plants are protected by the California Environmental Quality Act under the revised CEQA Guidelines (effective August 1983), Section 15380. Species appearing on the CNPS List 4 have limited distribution and their situation is being monitored. Those plants listed on the CNPS List 1 are (Presumed Extinct* in California by the California Native Plant Society. They may be known from other states.
- ² The Blunt-nosed Leopard Lizard was listed as an inhabitant of the Corral Hollow Ecological Reserve in 1974. It is not known if the species still inhabits the area as no species site checks have been made in recent years.

Source:

1. State of California Agency, Fish and Game Commission, and Department of Fish and Game. At the Crossroads, 1980 (as amended July 1983).
2. Amphibians and Reptiles Occurring in Corral Hollow. List prepared in 1974 by Dr. Robert Stebbins, submitted to the San Joaquin County Planning Department by Dan Gifford, Unit Manager of the Corral Hollow Ecological Reserve, December 1983.
3. Rare Plants by County, San Joaquin County. Computer printout from the California Native Plant Society's Rare Plant Program, January 12, 1984.
4. Rick York, California Native Plant Society, telephone conversation, July 1986.

7. FISHERIES

Species. The fisheries in San Joaquin County are an important commercial, recreational, and natural resource. They include the entire Delta and the Mokelumne, Stanislaus, San Joaquin, and Calaveras Rivers.^{1,2}

Over 700 miles of navigable waterways provide opportunities for sport fishing in the Delta. It is one of the largest and most important fisheries in California. The Delta is essential as a habitat for catfish and other resident fish, as spawning grounds for striped bass, and as the primary access from the ocean for salmon and other anadromous fish to the rivers of the Sierra Nevada.

Of the rivers which flow through San Joaquin County, the Mokelumne and Stanislaus are prominent. Below the Camanche Dam, the Mokelumne has a fish hatchery which serves as a spawning ground for salmon and steelhead. Striped bass are found in those portions of the river which are influenced by tidal activity, while shad are resident fish in both forks of the Mokelumne downstream of Thornton. The Stanislaus River supports salmon, although significant quantities of the riverbed's suitable spawning gravels have been lost in the past several decades due to siltation caused by intensive agriculture in the floodplain, vegetative encroachment, and gravel extraction.³

Habitat Requirements. Fish need suitable food supplies and cover. The removal of vegetation along watercourses reduces the quantity of suitable fish habitat and can cause an increase in water temperature which may lead to fish mortality.⁴ Maintaining shoreline and aquatic vegetation provides cover for protection from predators and serves as a food source.

Certain characteristics of the stream environment are necessary in order to ensure survival of fish. A stable flow of water which closely resembles the natural environment is the most critical element. This is not always easily achieved downstream of impoundments. The major rivers of San Joaquin County have been impounded in the Sierra Nevada mountains or foothills. Adequate streamflow is an important consideration for the dam operators. Water depth, force and velocity are characteristics which are closely associated with flow. Each fish species has specific requirements for each of these characteristics.

Chemical composition of the water, including dissolved oxygen levels, acidity, and salinity affect the environment for fish. Water quality in parts of the lower San Joaquin River has also decreased due to sewage and agricultural runoff. Excess sedimentation decreases oxygen levels and adversely affects spawning grounds.

Waterway obstructions can cause problems for migratory fish. Dams are the most serious obstacle; this can be mitigated to some degree with management facilities such as fish ladders or hatcheries. Some recreational and commercial uses of waters can adversely affect fish, as can the intentional or accidental introduction of species which can successfully out-compete native species or which are predatorial to native species.

TABLE IV.F-4: MOKELUMNE RIVER - ESTIMATED FLOW REQUIREMENTS FOR FISH
MIGRATION AND SPAWNING

<u>Month</u>	<u>Amount (cfs)*</u>	<u>Location</u>
January 1 to March 31	250	Woodbridge Dam to Tidewater
April 1 to June 30	150	Woodbridge Dam to Tidewater
July 1 to August 31	75	Woodbridge Dam to Tidewater
September 1 to December 31	250	Comanche Dam to Tidewater

(cfs)* = Cubic feet per second.

Source: San Joaquin County Council of Governments, Conservation Element, June 1973.

TABLE IV.F-5: STANISLAUS RIVER - ESTIMATED FLOW REQUIREMENTS FOR SALMON RUNS
AND SPAWNING GROUNDS

<u>Month</u>	<u>Amount (cfs)*</u>	<u>Location</u>
January 1 to February 28	150	Goodwin Dam to Mouth
March 1 to March 31	700	Ripon to Mouth
April 1 to April 30	900	Ripon to Mouth
May 1 to May 31	1200	Ripon to Mouth
June 1 to June 30	1000	Ripon to Mouth
July 1 to September 20	100	Goodwin Dam to Mouth
October 1 to December 31	200	Goodwin Dam to Mouth

(cfs)* = Cubic feet per second.

Source: California Department of Fish and Game. Report to the California State Water Resources Control Board on the Effect of the New Melones Project on Fish and Wildlife Resources of the Stanislaus River and the Sacramento-San Joaquin Delta. 1972.

TABLE IV.F-6: FALL RUN KING SALMON ESTIMATES FOR THE MOKELUMNE RIVER

<u>Year</u>	<u>Number of Salmon</u>	<u>Year</u>	<u>Number of Salmon</u>
1964	2,200	1975	2,000
1965	1,300	1976	600
1966	700	1977	400
1967	3,000	1978	1,100
1968	1,700	1979	1,500
1969	3,000	1980	3,200
1970	5,000	1981	5,000
1971	5,100	1982	9,000
1972	1,100	1983	15,900
1973	3,100	1984	6,000
1974	1,500	1985	7,700

Source: 1964-1972: San Joaquin County Council of Governments, Conservation Element, June 1973.

1973-1981: Mike Mines, California Resources Agency, Department of Fish and Game, Personal communication, January 1984.

1982-1985: Bob Reabis, California Resources Agency, Department of Fish and Game, personal communication, July 11, 1986.

TABLE IV.F-7: FALL RUN KING SALMON ESTIMATES FOR THE STANISLAUS RIVER

<u>Year</u>	<u>Number of Salmon</u>	<u>Year</u>	<u>Number of Salmon</u>
1965	2,000	1975	1,200
1966	3,000	1976	600
1967	1,200	1977	0
1968	6,000	1978	50
1969	12,000	1979	110
1970	9,000	1980	100
1971	14,000	1981	1,000
1972	4,000	1982	Not Available
1973	1,200	1983	500
1974	800	1984	12,000

Source: Mike Mines, California Resources Agency, Department of Fish and Game, personal communication, January 1974.

Bob Reabis, California Resources Agency, Department of Fish and Game, personal communication, July 1986.

Critical Issues. Some of the major fish which migrate through San Joaquin County waters are the king salmon and the striped bass. The commercially valuable king salmon migrate up the rivers for spawning. Its population can be threatened by lack of sufficient river flows and the export of water at the pumping plant at Tracy. Sufficient spring flows due to wet winters across the region in the early 1980's ensured average to excellent salmon runs on the Mokelumne and Stanislaus Rivers.⁵ Estimated flow requirements for anadromous fish migration and spawning are shown in Tables IV.E-4 and IV.E-5. Salmon runs are shown in Tables IV.F-6 and IV.F-7.

Striped bass are the most important gamefish in the Sacramento-San Joaquin Delta estuary. Their numbers have been declining in recent years. There are several possible reasons for the decline. First, the amount of zooplankton in the water which serves as their primary food source has declined. The cause of this is unknown. Second, water diversions by power plants, water projects, local agriculture and other industry have removed or reduced food sources such as small fish, eggs, and larvae. Third, there has been an increase in the level of toxicity in the waterways in recent years, due to runoff from agricultural pesticides, industry, ship discharges, and herbicides.⁶ Finally, the number of young fish has been declining, which leads to a decline in the number of adults, in a repetitive and dangerous cycle. This may be a result of other stresses on the striped bass population.

8. STRATEGIES FOR PRESERVATION

There are numerous techniques and programs for preservation of sensitive species and natural areas. Outlined below are some of the key approaches that would be useful in creating an effective and comprehensive management program.

Interagency Coordination. The County's resources, especially the Delta, are generally part of a larger, regional ecological community. Thus, it is important that the County cooperate with other agencies and jurisdictions that have responsibility for resource protection and restoration. On one level, this would involve the State and federal regulatory agencies such as the State Department of Fish and Game, the U.S. Fish and Wildlife Service, and the U.S. Army Corps of Engineers. On another level, it would involve cooperation with other local jurisdictions. The Delta Advisory Planning Council is a prime example of five counties and nine cities collaborating to establish a dialogue and to develop and maintain a comprehensive plan for the Delta.

Consultation with Resource Organizations. Efforts to study and develop protection programs need to be maintained. A number of private organizations should be tapped to assist in this effort and to identify potential threats to the resources by development. Among those groups with special knowledge are the California Natural Areas Coordinating Council, the California Native Plant Society, the Sierra Club, and the Audubon Society. These organizations can help suggest land use recommendations or mitigation measures to reduce negative impacts on habitat.

Conservation Easement. Because of the great expense of acquiring private lands, the County could purchase conservation easements in which only development rights are acquired, leaving title with the property owner. The easement would restrict development and may provide for public access.

Resource Area Designation. The County could establish or encourage the appropriate agency to designate areas with valuable natural features as resource areas. Possible types of designation include:

Areas of Special Biological Significance. Those areas containing unique or fragile biological communities that should not be subjected to controllable environmental degradation which results from man's activities. They are designated by the State Department of Fish and Game.

Ecological Reserve. Those areas set aside by the California Fish and Game Commission to preserve land, or land and water areas in a natural condition and to protect the aquatic organism and wildlife for public observation and scientific study.

Environmentally and Biologically Sensitive Areas. Those areas in which plant or animal life and their habitats are either rare or especially valuable because of their special nature or role in a life system and which are easily disturbed or degraded by human activities. This is a comprehensive designation and could include all previously mentioned resource areas, as well as endangered, rare, and threatened species habitats identified by the State Department of Fish and Game and the U.S. Fish and Wildlife Service and the palustrine (nontidal), riverine (channels), and lacustrine (open water) wetland habitats mapped as part of the National Wetlands Inventory.

Natural Preserve. Those areas included as part of the State park system containing outstanding natural or scientific significance and designated to preserve such features as rare or endangered plant and animal communities, geological features, topographic features, or biogeographical patterns.

Development Review. The County could develop and enforce special development regulations within identified resource areas. As part of its review, the County could require that structures be sited outside environmentally and biologically sensitive areas, that adequate setbacks be maintained around sensitive species and habitat areas, that development be clustered to maintain as much open space as possible, that land be dedicated as open space, as well as require other conditions be imposed that would mitigate potential adverse effects.

Endnotes

1. Don Stevens, Department of Fish and Game, California Resources Agency. Personal communication. July 1986.
2. Freddie Meyers, Department of Fish and Game, California Resources Agency. Personal communication. July 1986.

3. San Joaquin County Council of Government, Conservation Element. June 1973.
4. Ibid.
5. Bob Reabis, Department of Fish and Game, California Resources Agency. Personal communication. July 1986.
6. Dave Kolhorst, Department of Fish and Game, California Resources Agency. Personal communication. July 1986.

References

1. Audubon Society, Sacramento, Research and Scientific Committee. Areas of Critical Concern and Proposals for their Protection. September 1980.
2. Audubon Society, Stockton. Letter to San Joaquin County Department of Planning and Building Inspection. February 1984.
3. Bakker, Elna. An Island Called California: An Ecological Introduction to Its Natural Communities. University of California Press: Berkeley. 1972.
4. California Resources Agency. Delta Master Recreation Plan. September 1976.
5. California Resources Agency, Department of Fish and Game. Delta Wildlife Habitat Protection and Restoration Plan. Madrone Associates. December 1980.
6. California Resources Agency, Department of Fish and Game. Water Development and the Delta Environment, Delta Fish and Wildlife Protection Study, Report Number 7. December 1967.
7. California State Legislature, Emergency Delta Task Force. Recommendations to the Assembly Water, Parks & Wildlife Committee. January 12, 1983.
8. Sacramento County, Department of Planning and Community Development. Problems, Issues and Concerns within the Sacramento County Delta Regional, California, Draft Report. May 1986.
9. San Joaquin County Planning Department. Open Space/Conservation Element, San Joaquin County General Plan. June 1973.
10. Keith Taniguchi, Fish and Wildlife Biologist, U.S. Fish and Wildlife Service, Endangered Species Office. Personal communication. January 1989.
11. Ken Zanzi, U.S. Fish and Wildlife Service, Wildlife Division. Personal communication. 1988.

G. HERITAGE RESOURCES

1. INTRODUCTION

Historic preservation is the identification and protection of sites and structures of significance to the County's heritage. These resources of architectural, historical, archaeological or cultural significance are unique reminders of the social, economic, and political history of the County. Their preservation can benefit the County's culture and economy, facilitate good land use planning, and encourage reuse of the built environment.¹

Historic preservation of cultural resources preserves the tangible presence of the past. Through this, County residents can expand their understanding of their culture. The economic benefits of historic preservation are many, including an increase in tourism, resale value of property, and retail sales and commercial rents; lower replacement costs by recycling older buildings; and increased tax revenues for the community from an increase in appraisal evaluation.

Historic preservation can take the form of reinvestment in a neighborhood or community with architectural or historic merit. It can slow or reverse economic and physical decline, allowing the area to become a community resource rather than a problem. It can also encourage citizen participation and highlight the positive aspects of a neighborhood rather than the negative. Old Sacramento is an example of a successful restoration effort that has become a source of civic pride and income.

2. HISTORIC PRESERVATION PROGRAMS

There are historic preservation efforts at the City, County, State and Federal levels. Each is discussed later in this appendix. Many groups, clubs and quasi-social historic organizations exist or have existed in the past that promote their special interests in historic preservation. Many plaques and monuments exist throughout the County to attest to this fact. A list of organizations interested in historic preservation is available from the San Joaquin Historical Museum at Micke Grove Park.^{1,2}

In order to launch a successful historic preservation program several key ingredients are desirable:

- 1) widespread public interest;
- 2) a public awareness and education program to maintain and expand citizen interest;
- 3) a survey to identify the historic resources of the County; and
- 4) the adoption of a preservation ordinance creating a Preservation Board equipped with the authority and charged with the responsibility of the implementation of a historic preservation program.³

Federal Programs. The National Register of Historic Places is the official list of the nation's historic properties worthy of preservation. All historic areas in the National Park System, National Historic Landmarks, and properties of national, state, or local significance nominated by state or federal agencies are eligible for National Register listing.⁴

The benefits of a listing in the National Register include consideration in planning for federally assisted projects, eligibility of property owners for federal tax benefits, and qualification for federal grants for historic preservation.

Under the National Historic Preservation Act Amendments of 1980, direct participation of local governments in the National Historic Preservation program is now possible. To participate, local governments must satisfy the following minimum requirements: 1) adopt appropriate historic protection legislation, 2) establish a historic preservation commission, 3) survey and maintain an inventory of historic properties, 4) provide for public participation in the preservation program, and 5) satisfactorily perform delegated responsibilities. Once the local government is certified to participate, it will be included in the nominating process of the National Register and be eligible for a State Annual Historic Preservation Fund grant. The County has not chosen to participate in this program.^{4,5} Detailed information about the National Register Program and its criteria is available from the State Office of Historic Preservation in Sacramento.

Other Federal historic preservation organizations and programs include the Historic American Buildings Survey, The Historic American Engineering Record, Interagency Archaeological Services, Technical Preservation Services, and State Plans and Grants. Detailed information is available from the National Park System in Washington D.C.⁴

Historic Sites. A list of the National Register of Historic Places within San Joaquin County is contained in Table IV.G-1. In addition to the sites listed in the National Register, three additional sites have been determined to be eligible for listing in the National Register but are not presently on the list. They are: 1) the California Water Services Company, Station No. 1 Complex, 2) a house at 229 Della St., and 3) Stockton's Magnolia Historic Preservation District.

California Programs. The State Office of Historic Preservation (SOHP) administers three registration programs, the National Register of Historic Places (a federal program), the California State Historical Landmarks, and the State's Points of Historical Interest.

The State Historical Landmark Registration consists of a list of hundreds of sites which have played a prominent part in the state's history. In recent years, the State Historical Resources Commission has adopted new criteria for their review and evaluation of sites. Details on this program are available from the SOHP.⁴

TABLE IV.G-1: NATIONAL REGISTER OF HISTORIC PLACES IN SAN JOAQUIN COUNTY,
SEPTEMBER 30, 1987 (DATE OF APPROVAL)

Lockeford Area

1. Locke House and Barn, 1996 W. Elliot Road (6/19/72)
2. Locke's Meat Market, 13480 Highway 88 (2/19/82)

Stockton Area

1. El Dorado Elementary School, Harding Way and Pacific Avenue (8/15/77)
2. Wong Mansion, 345 W. Clay Street (9/20/78)
3. Nippon Hospital, 25 S. Commerce Street (9/18/78)
4. Old Weber School, 55 W. Flora Street (7/16/73)
5. Moses Rogers House, 921 S. San Joaquin Street (4/26/78)
6. Stockton Savings & Loan Society Bank, 301 E. Main Street (10/19/78)
7. Fox California Theater, 242 E. Main Street (6/27/79)
8. Sperry Union Flour Mill, 445 W. Weber Avenue (1/29/79)
9. Elks Building, 42 N. Sutter Street (6/3/80)
10. Farmers and Merchants Bank, 11 S. San Joaquin Street (10/9/80)
11. Commercial and Savings Bank, 343 E. Main Street (11/25/80)
12. Hotel Stockton, 133 E. Weber Avenue (4/1/81)
13. Sperry Office Building, 146 E. Weber Avenue (2/19/82)
14. Benjamin Holt House, 548 Park Street (3/2/82)
15. Tretheway Block, 229 E. Weber Avenue (10/29/82)
16. U. S. Post Office, 401 N. San Joaquin (2/10/83)

Lodi Area

1. Lodi Arch, Pine Street, Lodi (9/17/80)
2. Independent Order of Oddfellows Hall, Main Street, Woodbridge (4/22/82)
3. Terminous Culling Chute, 14900 W. State Route 12 (4/19/84)
4. Morse-Skinner Ranch House, 13063 State Route 99 (8/21/86)

Tracy Area

1. West Side Bank, 47 W. 6th Street (12/12/78)
2. Bank of Tracy, 801 Central (6/3/80)
3. Tracy Inn (Tracy Community Hotel) 24 W. 11th Street (10/31/80)
4. John Ohm House, 31524 S. Kasson Road (2/4/82)
5. Old Tracy Jail, Seventh Street (10/18/78)
6. Bank of Italy, 628 Central Avenue (7/18/85)

Source: Federal Register, Department of Interior, National Park Service. National Register of Historic Places: Annual Listing of Historic Properties, 1978 to 1987.

The criteria governing the State Points of Historical Interest Registration are generally the same as those which govern the State Historical Landmark Program, but this program is oriented to city or county areas. Under this program the County Board of Supervisors reviews and screens applications and then transmits those it feels appropriate, with their endorsement, to the State Historical Resources Commission for consideration. Information is available from the SOHP or the County Planning Division concerning this program.^{4,5} The SOHP also works with local, statewide, and national organizations to develop means of promoting historic preservation, including legislation, financing, education, easements, conferences and workshops, publications and audio-visual materials.

Historic Sites. San Joaquin County has five State Points of Historical Interest and 23 registered California State Historical Landmarks (see Tables IV.G-2 and IV.G-3).

**TABLE IV.G-2: STATE POINTS OF HISTORIC INTEREST IN SAN JOAQUIN COUNTY,
SEPTEMBER 30, 1987 (DATE OF APPROVAL)**

1. Old Weber School, 55 W. Flora St., Stockton (7/31/79)
2. Old Lockeford School, 19456 N. Jack Tone Rd., Lockeford (10/19/79)
3. Beckman Ranch House, 1150 W. Kettleman Lane, Lodi (12/21/81)
4. Harmony Grove Church Site, 11455 E. Locke Rd., Lockeford (3/1/82)
5. Eldon H. Gordon House, 15808 Fifth St., Lathrop (7/2/85)

Source: Eugene Itogawa, Historian, California Office of Historic Preservation. Letter of January 19, 1984 and February 26, 1986. Updated by San Joaquin County Division of Planning and Building Inspection, through 1988.

County Program. San Joaquin County contributes to historic preservation in several ways. First, the County museum complex at Micke Grove Regional Park has displays of items collected by the San Joaquin Historical Society that best portray the history and development of the County. The County museum also is the official depository of the County archives.² Second, the County contributes annually to the operating budget of the Haggin Museum in Stockton. Third, the County Development Code has provisions for the reuse of historic structures and the Building Division implements the State Historic Building Code and the State's Point of Historical Interest Program. Fourth, the San Joaquin Historical Society Landmarks Committee establishes and promotes historic landmarks. They will offer advice and review services with cooperation of the Museum staff. Finally, the County owns a State Point of Historical Interest (Harmony Grove Church, Lockeford).^{1,6,7}

TABLE IV.G-3:
CALIFORNIA HISTORIC LANDMARKS IN SAN JOAQUIN COUNTY, FEBRUARY 26, 1986

1.	No. 149	Benson's Ferry, 3 miles north of Thornton.
2.	No. 155	Lone Star Mill, 1 mile north of Clements.
3.	No. 162	Site of Mokelumne City, .3 miles east of Benson's Ferry north of Thornton.
4.	No. 163	Site of Wood's Ferry and Wood's Bridge, Mokelumne River, approximately 250' north of Woodbridge Irrigation District Diversion Dam, Woodbridge.
* 5.	No. 165	Weber Point and Site of Charles M. Weber's House, Weber Point, Stockton.
6.	No. 178	Site of First Building in City of Stockton, Lindsay Point, City Hall, Stockton.
7.	No. 214	Site of Battle Between Forces Under General Vallejo and San Joaquin Valley Indians, north bank, Stanislaus River, 6 miles West of Ripon.
8.	No. 358	Town of Woodbridge, laid out April, 1859, Woodbridge.
* 9.	No. 365	Lockeford (Lock's Ford) Locust Street, Lockeford.
* 10.	No. 436	New Hope, first known agricultural colony in San Joaquin Valley, Fourth and Locust Streets, Ripon.
* 11.	No. 437	New Hope Landing Place, first landing place of sailing launch "Comet" – first known sailing launch to ascend the San Joaquin River from San Francisco, 1 mile east of Highway 50 (Interstate 5) Bridge on the east bank of the San Joaquin River, south of Lathrop.
12.	No. 513	Burial Place of John Brown (Juan Flaco), Stockton.
13.	No. 520	San Joaquin Valley College, Woodbridge.
* 14.	No. 668	French Camp, Terminous Oregon-California Trail, French Camp.
15.	No. 740	Site of the City of Carnegie, 9 miles southwest of Tracy.

TABLE IV.G-3: (Cont.)
CALIFORNIA HISTORIC LANDMARKS IN SAN JOAQUIN COUNTY, FEBRUARY 26, 1986

16.	No. 755	Corral Hollow, stopping off place for 49ers, site of Indian Village on El Camino Viejo (Old Spanish Trail) and Edward B. Carrell House, 6.5 miles southwest of Tracy.
* 17.	No. 765	Temple Israel Cemetery, Stockton.
18.	No. 777	Site of San Joaquin City, 6 miles south of Manteca.
* 19.	No. 780.7	First Transcontinental Railroad--Site of completion of Pacific Railroad, one-half mile east of Highway 50 (Interstate 5) Bridge and Southern Pacific Bridge across San Joaquin River, south of Lathrop.
* 20.	No. 801	Reuel Colt Gridley Monument, Stockton Rural Cemetery, Stockton.
* 21.	No. 931	Lodi Arch, Pine and Sacramento Streets, Lodi.
22.	No. 934	Temporary Detention Camp for Japanese American (Fairgrounds), Stockton.
* 23.	No. 935	California Chicory Works, 1672 W. Bowman Rd., French Camp.

* Monument on site.

Source: California Historical Landmarks. Published by California Department of Parks and Recreation. 1982. Updated by San Joaquin County Division of Planning and Building Inspection through September 1988.

City Programs. Aside from the state and federal historic preservation programs, Stockton and Tracy have approved city historic landmarks and historic districts.

Stockton Landmarks Program. The Stockton City Council established the Stockton Cultural Heritage Board in 1969 to advise the Planning Commission on matters of aesthetic, cultural, and historical significance. Since enactment of the basic Landmark Ordinance in 1971, the 15 member citizen body has been instrumental in protecting Stockton's architectural and historic resources.⁶

The City of Stockton began a historic survey project of Stockton's "old city" in June of 1977. The survey of this 841 block area bounded by Harding Way, Wilson Way, Charter Way and Pershing Avenue is complete except for the northwest portion of the project area.⁶ As of September 21, 1988, the Cultural Heritage Board had approved 44 historic landmarks and two historical districts, the Magnolia Historic Preservation District and the Doctors' Row Historic Preservation District. A list is available at Stockton City Hall. City properties in the state and federal programs, are shown in the earlier Exhibits.

Tracy Landmarks Program. The City of Tracy has five properties on the National Register:

1. The West Side Bank, 47 W. 6th Street;
2. The Bank of Tracy, 801 Central;
3. The Tracy Inn (Tracy Community Hotel), 24 W. 11th Street;
4. The Tracy City Jail; and
5. The Bank of Italy, 628 Central Ave.

There are no State of California Historical Landmarks or Points of Historical Interest recognized within the city limits. In October 1977, a historic resources inventory was undertaken in the City of Tracy with funding from the State Office of Historic Preservation. Based on the finding of this survey the Tracy City Council recognized many structures and sites as Tracy's Historic Landmarks. A list is available at the Tracy Community Development Department.⁹

Manteca Landmarks Program. The City of Manteca has no officially recognized historical sites, landmarks, or buildings. An incomplete and preliminary inventory of 22 culturally significant historical resources within Manteca is available from the City Planning Department.^{10,11}

Ripon, Escalon and Lodi Programs. The cities of Ripon, Escalon and Lodi do not have local historic preservation programs. The earlier exhibits identify the cultural resources in the vicinity of these cities.^{12,13,14,15}

3. PALEONTOLOGICAL AND ARCHAEOLOGICAL SITES

Paleontological and archaeological sites are capable of yielding information about the prehistoric activities of man; evidence of earlier historic cultures that once inhabited an area, as well as sites of cultural, social or economic importance to these past peoples; and sites having spiritual or cultural significance to living Native Americans. The locations of paleontological and archaeological sites, unlike other types of historical resources, are not to be publicized. Archaeologists recommend that such sites be left untouched until competent professional research can be done. Site locations should be filed with a local archaeological society or institution and locations should only be made known to qualified researchers or when projects may threaten the integrity of the site.¹⁶

County Sites. The Central California Information Center at California State College, Stanislaus, reports, as of March 12, 1984, that 191 known archaeological, prehistoric, and ethnographic sites exist in San Joaquin County.^{17,18}

Three cultures, or "horizons," have been identified in the Central Valley and are characterized as follows:

1. Early Horizon ("Stone"), existing about 2500 BC-500 BC;
2. Middle Horizon ("Bone"), dating from 500 BC-800 AD; and
3. Late Horizon ("Shell"), dating from 800 AD-1820 AD.¹⁶

Heritage Resources (Cont.)

Three types of artifacts were first found in San Joaquin County sites: Charmstones, Stockton Curves, and Baked Clay Balls.¹⁶ In general, very little archaeological work has been completed in San Joaquin County, although it is thought that the local Native Americans were among the most highly organized socially and politically in California, and an archaeological investigation would provide considerable evidence of the dynamics of cultural change and socio-political stratification.¹⁶

Recent Research. Dr. L. Kyle Napton of the Stanislaus State College Department of Anthropology, in his *Seven California Counties: An Archaeological Overview* (May 1981), makes the following observations and recommendations¹⁶:

1. Since the 1970's, research-oriented archaeological investigations virtually ceased in the County and "EIR" or contact-oriented investigation has become dominant.
2. Although there are no known surviving Yokut Indians in the area, the Native American Indians do not desire archaeological excavation or study of any archaeological discovery.
3. Recent discoveries have found Native American Indians, archaeologists and developers all with opposing views of what should be done at the discovery site.
4. If circumstances permit, a search for Windmill (Early Horizon) and pre-Windmill sites should be undertaken. Archaeological surveys should be conducted in the following portions of San Joaquin County: the Coast Range, the Delta area, the eastern portion of the County, and the Lockeford area.

County Museum staff suggests the Mokelumne and Calaveras Rivers, Bear Creek, and Pixley Slough areas also be studied.

County Actions. The County is involved with paleontological and archaeological sites in two ways. First, most project applications require the gathering of environmental information. This can require a record search for sites to be undertaken by a qualified archaeologist. If significant site areas are found, actions are taken to protect the site. Second, if paleontological or archaeological sites are found during construction, the project will be stopped until a qualified archaeologist has investigated the area and has determined the appropriate actions to take to protect the resource.

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H. SUMMARY OF OPEN SPACE PLAN

1. INTRODUCTION

Current State law requires that every city and county have an open space and a conservation element of the General Plan. A recreation element is an optional element but is required if a jurisdiction wants to require park-in-lieu fees. State law also allows a jurisdiction to adopt their General Plan in any format which is "appropriate or convenient." What is necessary is that the required contents of the elements are discussed. Therefore, even though this section refers to "required elements," and the San Joaquin County General Plan 2010 does not contain "elements," the required contents of each element are contained in this General Plan. Refer to Figure i-1, Page ii, at the beginning of this document for the relationship of the San Joaquin County General Plan Sections to the State Mandated Elements.

Specifically, Government Code Section 65563 requires the County to have an adopted open space element for the "comprehensive and long-range preservation and conservation of open-space land within its jurisdiction." Open-space lands as defined in Government Code Section 65560(b) include:

- the preservation of natural resources including, but not limited to, areas required for preservation of plant and animal life, including habitat for fish and wildlife species; areas required for ecologic and other scientific study purposes; rivers, streams, bays and estuaries; and coastal beaches, lakeshores, banks of rivers and streams, and watershed lands;
- the managed production of resources, including but not limited to forest lands, rangeland, agricultural lands and areas of economic importance for the production of food or fiber; areas required for recharge of groundwater basins; bays, estuaries, marshes, rivers and streams which are important for the management of commercial fisheries; and areas containing major mineral deposits, including those in short supply;
- outdoor recreation, including but not limited to, areas of outstanding scenic, historic and cultural value; areas particularly suited for park and recreation purposes, including access to lakeshores, beaches, and rivers and streams; and areas which serve as links between major recreation and open-space reservations, including utility easements, banks of rivers and streams, trails, and scenic highway corridors;
- public health and safety, including, but not limited to, areas which require special management or regulation because of hazardous or special conditions such as earthquake fault zones, unstable soil areas, floodplains, watersheds, areas presenting high fire risks, areas required for the protection of water quality and water reservoirs, and areas required for the protection and enhancement of air quality.

The open space element should include an inventory of privately and publicly owned open space lands, goals and policies for preserving/managing open space lands, and a program of specific implementation measures (including open-space zoning pursuant to Section 65910).

The conservation element is, according to Section 65302(d) of the Government Code, supposed to provide for the "conservation, development, and utilization of natural resources including water and its hydraulic force, forests, soils, rivers and natural resources." This element contains almost identical information as that part of the open space element that deals with managed production of natural resources.

Since the recreation element is not a required element under State law, there are no legal requirements regarding its contents. The element should contain sufficient information to justify the collection of park-in-lieu fees (e.g. standards for amount of park land to be provided and locations of the parks) although this is no longer a requirement for collecting such fees. Prior to amendments to the State law in 1984, recreation elements were required to contain "a comprehensive system of areas and public sites for recreation, including the following, and, when practicable, their locations and proposed development: (1) natural reservations, (2) parks, (3) parkways, (4) beaches, (5) playground, (6) recreational community gardens, and (7) other recreation areas."

Because each of these aspects of the open space plan has been largely covered in portions of the Plan, this appendix is intended to function as an index, identifying where a discussion of each type of open space land can be found. Mandatory issues to be addressed in the Conservation Element are included here under "Managed Production of Natural Resources;" issues related to the Recreation Element are included here under "Outdoor Recreation."

2. PRESERVATION OF NATURAL RESOURCES

Open space for the preservation of natural resources includes "areas required for preservation of plant and animal life, including habitat for fish and wildlife species; areas required for ecologic and other scientific study purposes; rivers, streams, bays and estuaries; and coastal beaches, lakeshores, banks of rivers and streams, and watershed lands."

A discussion of these natural resources can be found principally in the following two sections of the Plan and associated appendices:

- o Water resources and quality (which addresses preservation and management of the beneficial uses of the groundwater and along the County's waterways); and
- o Vegetation, fish, and wildlife habitat (which inventories the County's plant and animal life and addresses strategies for their preservation).

Water resources, especially the Delta, are one of the County's most important natural resources for outdoor recreation, vegetation, wildlife habitat, scenic value, flood control, and water supply. Nearly 400 miles of the County's waterways are used for boating and over half of all County households fish from the river banks. Changes in water flows, development along the waterfront, inadequate public access, and overuse of the existing resources can all threaten the plant and wildlife habitat and disturb the natural setting and experience. Development standards and public access guidelines are required to maintain the integrity of the County's water resources.

The Delta is an ecological resource of statewide significance. It harbors numerous sensitive plant and animal species, contains extensive wetlands areas, and is a major wintering area along the Pacific Flyway. The southwest foothills and grasslands provide habitat for the mule deer, the endangered San Joaquin kit fox, the endangered large-flowered fiddleneck, and a number of other protected species. Significant stands of Valley oaks are found on the Valley floor. The waterways, including the Mokelumne, Stanislaus, San Joaquin, and Calaveras Rivers, and the Delta contain important fisheries and spawning grounds. Urban encroachment and loss of habitat, can seriously jeopardize the diversity of plant and animal life in the County and need to be curtailed.

3. MANAGED PRODUCTION OF RESOURCES

Open space for the managed production of resources includes "forest lands, rangeland, agricultural lands and areas of economic importance for the production of food or fiber; areas required for recharge of groundwater basins; bays, estuaries, marshes, rivers and streams which are important for the management of commercial fisheries; and areas containing major mineral deposits, including those in short supply." This overlaps with Section 65302(d) of the Government Code which requires a conservation element for the conservation, development and utilization of natural resources including water, soils, rivers, fisheries, and wildlife.

A discussion of these resources can be found principally in the following two sections of the Plan and the associated appendices:

- o Agricultural lands (which address utilization of the County's soils); and
- o Extractive resources (which addresses management of the County's sand and gravel aggregate resources, natural gas fields, and other mineral resources).

In 1987, nearly 639,000 acres of lands were harvested, contributing to the County's usual ranking among the State's top 10 counties for agricultural production. In addition, substantial acreage was used for grazing each livestock production. The County's highly productive soils generate about \$750 million of revenue for the County. About 90% of the County's total land area is devoted to agriculture. In the face of significant urban pressures, the acreage of farmland converted to other uses has been on the rise.

Because of its economic potential, its contribution to the rural, scenic setting, and its uniqueness (once prime agricultural soils are committed to other uses, it is difficult, if not impossible, to retrieve the soils for cultivation), the County needs to preserve its agricultural resources. There are no timber resources subject to timberland zoning.

Extensive groundwater recharge areas are identified in five areas of the County: a north central area around Lodi and along the Mokelumne River; a northeastern area encompassing Waterloo, Linden, and Bellota between the Calaveras River and the Mormon Slough; an east central area around Farmington at the confluence of Duck Creek and Little Johns Creek; a large southeastern area, encompassing Manteca, Ripon, and Escalon, between the San Joaquin River and Lone Tree Creek; and a southwestern area, including and extending south of Tracy. Numerous waterways in the County accommodate commercial fisheries, the most prominent being the Delta, the Mokelumne River, and the Stanislaus River.

The State has identified several mineral deposits in the County as being of regional or statewide significance: an area along the San Joaquin River at State Route 120; an extensive area around Corral Hollow Road and the Tracy Airport; and an area north of I-580 and south of State Route 132. The primary extractive resources in the County are its sand and gravel deposits. In 1986, over 3.7 million tons were mined. It is estimated existing reserves could be depleted before the end of the planning horizon for this Plan. To protect the existing resources as well as those yet unexcavated, the County must ensure its urban land use development pattern does not encroach upon these identified deposits. Buffers and very low density/open-space type designations would be compatible with excavation activities.

4. PUBLIC HEALTH AND SAFETY

Open space for public health and safety includes "areas which require special management or regulation because of hazardous or special conditions such as earthquake fault zones, unstable soil areas, floodplains, watersheds, areas presenting high fire risks, areas required for the protection of water quality and water reservoirs and areas required for the protection and enhancement of air quality."

A discussion of open space for public health and safety can be found in the following sections of the Plan and associated appendices:

- Seismic and geologic hazards (which addresses fault zones, potential areas of liquefaction and subsidence, and areas susceptible to landslides);
- Flood hazards (which addresses hazards within the 100-year floodplain and dam inundation areas);
- Fire safety and law enforcement (which addresses hazardous areas because of wildland and/or peat fires);

- Noise (which addresses areas susceptible to excessive noise levels); and
- Hazardous materials and wastes (which addresses hazards around hazardous waste sites).

Seismic and geologic hazards in the County are relatively limited. The State Division of Mines and Geology has not yet surveyed the County to designate Alquist-Priolo Special Studies Zones around active or potentially active faults. The Tracy-Stockton Fault traverses urban areas and if better located could require an appropriate setback to ensure structures are not constructed where the ground would rupture. More serious effects are likely to result from potential ground shaking or failure during a major earthquake. The areas most susceptible to liquefaction include the Delta, Thornton, Lodi, Manteca, and Ripon areas. While such hazards require special foundation and construction design, they would not prohibit development. Areas that should be largely committed to open space lands are the foothills in the southwest part of the County which have a high likelihood of experiencing landslides.

The hazard with the most extensive implication for restricting urban development is flooding. The 100-year floodplain, delineated by the Federal Emergency Management Agency, covers more than one-third of the County. The floodway portion of the floodplain must be kept free of structures so that the water-carrying of the stream is not reduced. In contrast, development may occur within the floodway fringe of the floodplain, provided that it complies with federal standards.

Fire hazards are considered to be high around outlying residential parcels and unirrigated parklands, where access by fire fighting personnel and equipment is limited, water availability may be uncertain, and the area is characterized by grass-covered, dry grazing lands. It is desirable to leave these areas largely in open space, unless there are adequate on-site fire suppression systems, because of the difficulty of controlling wildland fires.

Excessive noise can disrupt activities such as sleep, speech, and learning. Accordingly, the land use pattern must be compatible with the noise environment. For example, it would generally be unacceptable to locate a school in an area with high noise level (greater than 70 decibels). Noise levels do not dictate that an area be restricted to open space, but they can influence which types of uses are acceptable. Similarly, the presence of hazardous materials or explosive testing areas do not mandate an adjacent site be maintained as open space, but may constrain the range of permitted uses.

5. OUTDOOR RECREATION

Open space for outdoor recreation includes "areas of outstanding scenic, historic and cultural value; areas particularly suited for park and recreation purposes, including access to lakeshores, beaches, and rivers and streams; and areas which serve as links between major recreation and open space reservations, including utility easements, bank of rivers and streams, trails, and scenic highway corridors."

Open space for outdoor recreation is discussed primarily in the following sections of the Plan and associated appendices:

- Public facilities (which includes a section on recreational resources and opportunities in the County, including trails and scenic corridors, and the level of participation by County residents); and
- Heritage resources (which describes significant cultural, archaeological, and paleontological sites and resources).

The recreational areas and resources in the County are plentiful, ranging from fishing and boating along the Delta, picnicking and active recreation at 21 County and regional parks, camping and hunting, leisure rides along the designated bikeways and scenic routes, team sports at the numerous play fields and parks, motorcycling at Carnegie Cycle Park, etc. The Recreation portion of the Public Facilities Appendix also assesses the demand and spatial requirements necessary to adequately serve future residents and proposes additions/improvements to the County's regional parks, Delta facilities, and trails system.

Heritage resources include the wealth of historical and cultural sites that remind and educate people of the County's past. They include historic buildings, collections at the County Historical Museum, historic places, and sites yielding information about the prehistoric activities of man. A strong commitment to preservation is needed to ensure that these links to the past are protected. The preservation of archaeological and paleontological sites may require that they be left undeveloped as open space.

6. OPEN SPACE ACTION PROGRAM

A variety of actions are already in place in the County to conserve and manage its open space resources. Additional actions are proposed as part of the revision of the General Plan and the Development Title. A summary of these programs is presented here and is divided into five basic types of action: zoning, acquisition, participation in intergovernmental studies, environmental assessment, and specific programs.

Open Space Zoning. Section 65910 of the State Government Code requires every city and county to adopt an open-space zoning ordinance consistent with the local open-space plan. The County's proposed Development Title contains several zoning districts and many development regulations and standards that, in aggregate, function as an open-space ordinance and serve to implement the open space plan and policies. The following districts of the proposed Development Title are intended to comply with these requirements.

Zoning Districts. The Development Title creates several zoning districts whose intent is to restrict development and maintain open space and agricultural areas through large-lot zoning. The zoning districts are:

- General Agriculture, established to preserve agricultural lands;
- Limited Agriculture, established to recognize and preserve areas that contain existing concentrations of small-scale agricultural operations;
- Agriculture-Urban Reserve, intended to retain in agriculture those areas planned for future urban development in order to facilitate compact, orderly urban development and to assure the proper timing and economical provision of services and utilities;
- Rural Residential, established to provide for large-lot rural homesites without undue detriment to agricultural productivity; and
- Public Facilities, established for all publicly owned, including recreational, facilities.

Development Regulations. In addition, the Development Title contains provisions regarding:

- the location and development of recreational vehicle parks;
- the preservation of historic resources;
- the conservation and development of identified significant mineral resources;
- subdivision regulations that address public health and safety issues of soil hazards and contamination of water resources from discharge, as well as natural resources issues of protection of fish, wildlife, and their habitat;
- provision and/or financing park and recreational facilities;
- safety regulations for flood hazards, hazardous waste disposal, and airport and noise compatibility;
- development limitations on the Delta Islands and slopes with landslide susceptibility rating 1; and
- Williamson Act contracts and preservation of agricultural lands.

Acquisition. The County shall study four sites identified as potential regional parks and initiate acquisition if the sites are found to be appropriate and when funds become available. In addition, those areas that have special features or are threatened by impending urban development are to be accorded special

consideration. Conservation easements shall be acquired for preservation of riparian vegetation along the Mokelumne River.

Acquisition techniques that are available to the County include:

- acquisition of fee simple interests through outright purchase, gifts, or eminent domain;
- acquisition of easement interests, in which only the development rights are acquired, pursuant to the Conservation Easement Act, the Open Space Easement Act of 1974, or the Scenic Easement Deed Act;
- leasing, in which the County controls use of the land but is not the owner;
- lease - purchase agreements, in which open space is leased by the County with the ultimate objective of owning the area;
- purchase and resale, whereby open space is acquired by the County and resold with certain conditions on development;
- purchase and lease, whereby open space is acquired by the County and leased back to the original owner for uses compatible to open space;
- joint acquisition, in which the County would participate with another public agency or organization in the purchase of lands;
- land swapping, whereby a trade or transfer of land is made with other public or private parties;
- eminent domain, whereby the County uses its police power to acquire land.

Funds for acquisition of open space are usually limited and pose one of the biggest barriers to preserving the resources. Funding sources potentially available include the Regional Open Space, Wildlife, Shoreline and Parks Bond passed in 1988 by the State; the California Wildlife, Coastal, and Park Land Conservation Bond Act, also passed in 1988; project mitigation funds proposed as part of the General Plan; various state and federal grant programs; a county park bond issue; and the County's General Fund.

Intergovernmental Coordination. The County shall continue to participate in regional efforts, such as the Delta Advisory Planning Council, that seek to preserve the County's significant natural and recreational resources. In particular, the County supports:

- public acquisition of the unleveed channel islands in the Delta;

Summary of Open Space Plan (cont.)

- inclusion of recreation sites and trails in the state/federal Delta levee rehabilitation program;
- maintenance of the navigability of the County's waterways by the Corps of Engineers or other appropriate agencies;
- State acquisition of Brovelli Woods;
- State study to determine feasibility of publicly developing and/or acquiring Delta islands for marsh and/or riparian restoration purposes;
- State acquisition of ecological reserves;
- independent on-going projects by the State Department of Fish and Game or other agencies to restore wetlands and riparian habitat and establish jurisdictional control for project monitoring;
- efforts to determine required flow levels and other stream characteristics to support fish life in waterways;
- a joint federal-state levee rehabilitation program to identify seismic and flooding hazards and to provide a level of protection consistent with intended development; and
- programs and funding for determination of site contamination and cleanup of hazardous wastes.

Environmental Assessment. The County's General Plan identifies Resource Conservation Areas which include waterways, floodways, significant oak groves, significant riparian vegetation, and riparian woodlands. Any development proposed within these areas are required to conduct environmental assessments to identify the sensitivity of the resources and measures to protect these resources. Development may be permitted but would be subject to conditions defined by the environmental assessment. Project proponents, for example, would be required to mitigate potential impacts and fund habitat restoration and post-project monitoring.

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that proper record-keeping is essential for the integrity of the financial system and for the ability to detect and prevent fraud. The document also highlights the need for transparency and accountability in all financial dealings.

The second part of the document provides a detailed overview of the various types of transactions that are subject to reporting requirements. It includes information on the different categories of transactions, such as cash transactions, credit transactions, and foreign transactions. It also discusses the specific reporting requirements for each type of transaction, including the timing and format of the reports.

The third part of the document discusses the consequences of failing to comply with the reporting requirements. It outlines the penalties that may be imposed for non-compliance, including fines and imprisonment. It also discusses the importance of cooperating with the authorities in the event of an investigation.

The fourth part of the document provides a summary of the key points discussed in the document. It reiterates the importance of maintaining accurate records and the need for transparency and accountability. It also provides a final reminder of the consequences of non-compliance.

GLOSSARY

A

ADT (Average Daily Traffic) - Total volume of vehicles crossing a fixed point over a 24-hour period, averaged over a month, a year or several years.

Accessibility - The relative ease with which a location can be reached via various modes of transportation.

Acoustics - (1) The science of sound, including the generation, transmission, and effects of sound waves, both audible and inaudible. (2) The acoustics of an auditorium or of a room, the totality of those physical qualities (such as size, shape, amount of sound absorption, and amount of noise) which determine the audibility and perception of speech and music.

Acoustical Report - A report analyzing the noise environment, existing and projected.

Acre-Foot - A water volume measurement term, equal to the amount of water which would cover an area of one acre to a depth of one foot. An acre-foot equals 325,851 gallons.

Aesthetics - The perception of artistic elements, or elements in the natural or built environment that are pleasing to the eye.

Air Basin - A self-contained region with minimal influence on air quality from contiguous regions. California's 14 air basins have been established by the Air Resources Board. San Joaquin County lies within the San Joaquin Valley Air Basin.

Air Pollution Control District (APCD) - Single or multi-county agency with legislative authority to adopt and enforce all rules and regulations necessary to control non-vehicular sources of air pollutants in its area.

Air Pollutant Emissions - Discharges into the atmosphere, usually specified in terms of weight per unit time for a given pollutant from a given source.

Air Quality Standards - A health based standard for air pollution established by the federal government and the State.

Airborne Sound - Sound that reaches the point of interest by propagation through air.

Alluvium - A geological term describing beds of sand, gravel, silt, and clay deposited by flowing water. "Younger" alluvium is sand, gravel, silt, and clay deposits of recent geologic age. "Older" alluvium is characterized by deposits dating back hundreds of thousands to more than one million years.

Alquist-Priolo Special Studies Zones Act - A state law mandating that geologic investigations be conducted prior to the approval of proposed new real estate developments or issuance of building permits within delineated special study zones. Established by the State Public Resources Code Section 2621 op cit.

Ambient Air Quality - The quality of the air at a particular time and place.

Ambient Noise - See Background Noise.

Annual Average Daily Traffic (Annual ADT) - Total traffic volume for the year divided by 365 days.

Antiquated Subdivisions - Subdivisions that 1) were approved prior to October 19, 1961, 2) are undeveloped or only partially developed and 3) could not be approved as subdivisions now because of more stringent or different requirements.

Aquifer - A geologic formation or structure that contains water, which may be used to supply the needs for a water development, such as a well.

Area Source - Any small individual fuel combustion source, including off-road vehicles and pesticides.

Artificial Recharge - The recharging or replenishing of aquifer water at a rate greater than natural, resulting from activities including drilling holes to increase ground permeability and basin-spreading to retain water for continuous recharge.

Attack - 4-wheel drive truck primarily used to get fire protection services into hilly or rough terrain in order to help control grass and brush fires.

A-Weighted Sound Level (dBA) - A quantity, in decibels, read from a standard sound-level meter that is switched to the weighting network labeled "A." The A-weighting network discriminates against the lower frequencies according to a relationship approximating the auditory sensitivity of the human ear at moderate sound levels. The A-weighted sound level measures approximately the relative "noisiness" or "annoyance" of many common sounds.

B

Background Noise - The total of all noise in a system or situation, independent of the presence of the desired signal.

Basic Industry - Industrial activities in a region which provide the means of payment for raw materials, food, and manufactured products which the region cannot produce itself and also support the service activities, which are principally local in scope.

Buffer Lands - Lands that provide a separation between activities to protect the public or adjacent uses.

Building Coverage - The amount of land covered or permitted to be covered by a building, usually measured in terms of percentage of a lot.

C

Capacity - Maximum number of vehicles or riders (transit) that can be carried by a facility (e.g., a highway or a train) during a determined period of time.

CEQA - California Environmental Quality Act.

CO - Carbon monoxide.

Collector Road - A roadway with uncontrolled access connecting arterials and freeways to local streets and private residences and businesses.

Compatibility - The characteristics of different uses or activities that permit them to be located near each other in harmony and without conflict.

Conjunctive Use of Water - The balanced use of the groundwater resource and the surface water resource so that both riparian needs and agriculture-urban consumption needs are met.

Concentrations - A measure of the average density of pollutants, usually specified in terms of pollutant mass per unit volume of air (typically in micrograms per cubic meter) or in terms of relative volume of pollutant per unit volume of air (typically in parts per million).

Conservation - The management of natural resources to prevent waste, destruction, or neglect.

Contour, Noise - The boundary of noise of a specified level from the noise source. The noise contour is determined by the magnitude and frequency of the noise and by the physical environment.

CNEL - A 24 hour average of the sound level, measured in decibels, for a period from midnight to midnight. The average is weighted by adding 10 decibels to sound levels from midnight to 7 a.m. and from 10 p.m. to midnight, with an intermediate weighting for the early evening hours between 7 p.m. and 10 p.m.

Cycles Per Second - See Frequency.

D

Day-Night Average Sound Level (Ldn) - The twenty-four hour energy average of the A-weighting sound pressure level, with the levels during the period 10 p.m. to 7 a.m. the following day increased by 10 dBA before averaging.

Decibel - The unit in which the levels of various acoustical quantities are expressed. Typical quantities so expressed are sound pressure level, noise level, and sound power level.

Dedication - Transfer of ownership of land or capital improvement to a public agency.

Dedication, Fee In Lieu of - Payments of cash which are authorized in subdivision regulations when requirements for mandatory dedication of land cannot be met because of physical conditions of the site or other reasons. The conditions under which such payments will be allowed and the formula for calculating the amount are spelled out in the regulations.

Density - The average number of families, persons, or housing units per unit of land; usually density is expressed "per acre." Thus, the density of a development of 300 units occupying 40 acres is 7.5 units per acre.

Design Speed - The maximum safe speed that can be maintained over a specified section of highway when conditions are so favorable that the design features of the highway govern.

Discretionary Project - A project which requires the exercise of judgment or deliberation when the public agency decides to approve or disapprove a particular activity, as distinguished from situations where the public agency merely has to determine whether there has been conformity with applicable statutes, ordinances, or regulations.

Dry Period - An historic period of years when water supply is much below normal. An example was 1929-34 when the water in Northern California streams averaged only 38 percent of normal. It has been used as a reference drought situation in water resource planning.

E

Effluent - Wastewater.

Emission Inventory - Inventory of types, sources, and amounts of air emissions within a geographical region.

Erosion - The process by which soil and rock are detached and moved by running water, wind, ice, and gravity.

Equivalent A-Weighted Sound Level (Leq) - The constant sound level that, in a given situation and time period, conveys the same sound energy as the actual time-varying A-weighted sound.

Exaction - A requirement to be met as a condition of development approval.

Extractive Resources - Natural resources which are removed from their place of discovery. The primary extractive resources in San Joaquin County are sand, gravel and natural gas.

F

Fault - A fracture in the earth's crust forming a boundary between rock masses that have shifted.

Fire Break - A natural or artificial barrier where vegetation has been removed for fire-control purposes.

Fire Hazard Zone - An area where, due to slope, fuel, weather, or other fire-related conditions, the potential loss of life and property from a fire necessitates special fire prevention measures and planning before development occurs.

Flag Lot - An 'L'-shaped or 'T'-shaped lot in which one arm of the lot fronts on a public road and is used solely as a driveway.

Flood Fringe - The area of the one hundred (100) year flood, exclusive of the floodway, as shown on the Flood Insurance Maps and any area determined by the Floodplain Administrator to have a one percent (1%) or greater probability of flood in any given year.

Floodplain - Any land area susceptible to inundation by water from any source.

Floodway - The channel of a waterway and the adjacent land areas that are necessary to discharge the one hundred (100) year flood without cumulatively increasing the water surface elevation more than one (1) foot.

Freeway - High speed roadway with full control of access.

Frequency - The number of oscillations per second (a) of a sine-wave of sound, and (b) of a vibrating solid object; now expressed in hertz (abbreviation Hz), formerly in cycles per second (abbreviation cps).

Fuel Break - A wide strip of land on which native vegetation has been substantially reduced through thinning, trimming, or pruning, or changed to vegetation types which burn with lower intensity so that fires can be more readily extinguished.

Fuel Loading - The quantity of vegetation and other fuel per unit of land area.

Fuel Management or Fuel Modification - The use or removal of plants in the wildland to reduce the possibility of fire while at the same time preserving and enhancing environmental quality.

G

GPD - Gallons per day.

GPM - Gallons per minute.

Geotechnical Evaluation - A professional evaluation using scientific methods and engineering principles of geology, geophysics, hydrology, and related sciences.

Ground Failure - Mudslide, landslide, liquefaction, or the seismic compaction of soils.

Groundwater - Water within the earth that supplies wells and springs. Specifically, water in the zone of saturation where all openings in soils and rocks are filled, the upper surface of which forms the water table.

H

HC - Hydrocarbons.

Habitat - The natural environment of a plant or animal.

Hazardous Waste Facility - Any structure, other appurtenances, improvements on the land, and all contiguous land used for the treatment, storage, disposal, resource recovery, transfer, or recycling of hazardous wastes.

Hearing Loss - At a specified frequency, an amount, in decibels, by which the threshold of audibility for that ear exceeds a certain specified audiometric threshold, that is to say, the amount by which a person's hearing is worse than some selected norm. The normal may be the threshold established at some earlier time for that ear, the average threshold for some large population, or the threshold selected by some standards body for audiometric measurements.

Hertz - See Frequency.

Heritage Trees - Trees of a substantial size or age or having a significant history.

Hydrology - The origin, distribution, and circulation of water of the earth precipitation, streamflow, infiltration, groundwater storage, and evaporation.

I

Important Farmland Inventory System (U.S. Soil Conservation Service) - A new land classification system based upon ten soil and climatic characteristics.

Improved Land - Raw land which has been provided with basic utilities such as water and sewerage, streets, and, if required, sidewalks; such improvements normally precede residential or other construction.

Infiltration - Leakage of sewage into groundwater due to faulty pipes, old joints, etc.

Infrastructure - Facilities needed to serve development, such as sewer, water, drainage, transportation, and other public facilities.

ISO Rating - A standard schedule for evaluating the fire defenses and physical conditions of municipalities developed by the Insurance Services Office (ISO), Municipal Survey Service. Fire defenses are weighted for evaluation on the basis of 39% for water supply, 39% for fire department, 13% for fire safety control, and 9% for fire service communications. In an evaluation, deficiency points are assigned for deviation from the criteria published by the Insurance Services Office. Reliability and adequacy of the following major water supply items are considered in the schedule: water supply source, pumping capacity, power supply, water supply, mains, distribution mains, spacing of valves, and location of fire hydrants. Each municipality is then rated on a scale from 1 to 10, where 1 is superior and 10 is unprotected.

L

Land Capability Classification (U.S. Soil Conservation Service) - A grouping of soils into classes (I-VIII), subclasses, and units according to their suitability for agricultural use, based on soil characteristics and climatic conditions.

Landslide - A general term for the falling of a mass of soil or rocks.

Liquefaction - A process by which water-saturated granular soils are transformed from a solid to a liquid state because of a sudden shock or strain, such as an earthquake.

Level of Service - Level of service (LOS) expresses the conditions existing under various speed and volume conditions on any roadway. These levels of service, designated A through F, from best to worst, cover the entire range of traffic operations that may occur. Operationally, level of service is measured by vehicle/capacity (V/C) ratios, which measure the capacity of a given roadway in relation to the amount of traffic it serves. The County defines LOS as follows:

A - V/C = 0 - .34	D - V/C = .75 - .89
B - V/C = .35 - .50	E - V/C = .90 - .99
C - V/C = .51 - .74	F - V/C = 1.00+

Level - Uniform intensity of sound. The level of an acoustical quantity (e.g., sound intensity) in decibels is 10 times the logarithm (base 10) of the ratio of the quantity to a reference quantity of the same physical kind.

M

Masking - The action of bringing one sound (audible when heard alone) to inaudibility or to unintelligibility by the introduction of another, usually louder, sound. See Masking Noise.

Masking Noise - A noise which is intense enough to render inaudible or unintelligible another sound which is simultaneously present.

Mass Transit - Refers to any form of passenger transportation that carries members of the public on a regular and continuing basis.

Maximum Credible Earthquake - The maximum probable earthquake intensities that can be expected to occur.

Minerals - Naturally occurring organic and inorganic processes, including peat, bituminous rock, and aggregate minerals, but excluding natural gas and petroleum.

Ministerial Project - A project that must be approved if it meets applicable statutes, ordinances, or regulations.

Mixed Use Development - Two or more uses that are integrated and developed under a coherent plan.

Mobile Source - A moving source of air pollution such as an automobile or truck.

N

Noise - Any sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying.

Noise Barrier - A wall or other barrier designed to reduce noise levels to acceptable limits in areas planned for development.

Noise Level - See Sound Level.

Noise Sensitive Land Uses - Land uses that are most affected by exterior noise, including schools, churches, hospitals, convalescent homes, and single family residence.

Non-Attainment Areas - Area where federal or state air pollution standards have been exceeded.

Non-Point Source Pollution - Pollution whose source is general rather than specific in location. It is widely used in reference to agricultural and related pollutants. For example, logging operations production of sediments, agricultural pesticide applications, automobile exhaust pollution, etc.

Nonrenewable Natural Resources - Inanimate resources that do not increase significantly with time and whose use diminishes the total stock (e.g., minerals and fossil fuels).

NO_x - Nitrogen oxides.

O

Off-Site - Reference to location not on (or abutting in the case of a roadway) the property that is being reviewed.

On-Site - Reference to location on (or abutting in the case of a roadway) the property that is being reviewed.

One Hundred Year Flood - A flood that has a one percent (1%) or greater possibility of occurring in any given year.

O_x - Oxidant (ozone).

P

Parcel - A lot, or a contiguous group of lots in single ownership or under single control, and usually considered a unit for purposes of development.

Particulates - Particles, such as dust, suspended in the air.

Peak Hour - The hour at which the greatest volume of traffic occurs. This value is useful to traffic engineers in estimating the amount of congestion experienced, and shows how near to capacity the highway is operating. Unless otherwise indicated, peak hour values indicate the volume in both directions. A few hours each year are higher than the "peak hour" but not many. In urban and suburban areas, the peak hour normally occurs every weekday, and 200 or more hours will all be about the same. On roads with large seasonal fluctuations in traffic, the peak hour is the hour near the maximum for the year but excluding a few (30 to 50 hours) that are exceedingly high and are not typical of the frequency of the high hours occurring during the season.

Peak Hour/Peak Direction Factor - Percent factor expressing peak hour/peak direction traffic as proportion of ADT.

Peak Hour/Peak Direction Traffic - Highest peak hour traffic of both directions.

PM-10 - Suspended particles with an aerodynamic diameter less than or equal to a nominal 10 micrometers.

Planned Development (PD) - A form of development usually characterized by a unified site design for a number of buildings, the clustering of buildings and provision of common open space, density increases, and a mix of building types and land uses.

Plat - A map, generally of a subdivision, showing the location, boundaries, and ownership of individual properties.

Point Source Pollution - Pollution whose source is specific rather than general in location. For example, particulate matter emanating from a specific smoke stack is point source pollution.

Prime Agricultural Land - (1) As defined in the Farmland Mapping and Monitoring Program upon completion of the maps for San Joaquin County. Until that time, (2) land best suited for producing food, feed, forage, fiber and oilseed crops and which is available for these uses and has the soil quality, growing season and moisture supply needed to produce sustained high yields of crops economically when treated and managed, including water management, according to modern farming methods; or (3) when in reference to Williamson Act contracts, any land so termed and defined by Section 51201 of the Government Code.

Project Study Report - Report prepared or accepted by Caltrans to analyze road or interchange needs.

Public Facilities and Services - The structures, equipment, staff, etc., that serve development and may include, but is not limited to, waste disposal, water, drainage, roadways, recreation, libraries, law enforcement, and fire protection.

Q

Raw Land - Vacant land, unsubdivided and unimproved with utilities.

Reclamation (Surface Mining) - The combined process of land treatment that minimizes water degradation, air pollution, damage to aquatic or wildlife habitat, flooding, erosion, and other adverse effects from surface mining operations including adverse surface effects incidental to underground mines, so that mined lands are reclaimed to a usable condition which is readily adaptable for alternate land uses and create no danger to public health or safety. The process may extend to affected lands surrounding mined lands and may require backfilling, grading, resoiling, revegetation, soil compaction, stabilization, and other measures (Public Resources Code Section 2733).

Regional Air Quality - The ambient air quality in a large area.

Renewable Natural Resources - Living resources, usable at different times and self-renewing (e.g., soils, forests, plants).

Review Authority - The following entities, which are empowered to interpret, implement and enforce the Development Title:

- a. Board of Supervisors;
- b. Planning Commission;
- c. Director of Community Development Department; and
- d. Community Development Department.

Riparian Habitat - The banks and other terrestrial environs of fresh water bodies, watercourse, estuaries, and surface waters whose conditions provide soil moisture sufficiently in excess of that otherwise available through local precipitation to potentially support the growth of mesic vegetation.

Riparian Woodland - A riparian habitat characterized by trees 20 feet or taller that compose the dominant vegetation element of the plant community.

S

Safe Yield - The maximum quantity of water than can be continuously withdrawn from a groundwater basin without adverse effect.

Saline Intrusion - The invasion of salt water into a body of fresh water, occurring in either surface or groundwater bodies.

Scenic Corridor - The bands of land generally adjacent to the scenic highway right-of-way that complete the visual appearance and integrity of the total composition of the scenic highway. The boundaries of the scenic corridor may coincide with the boundaries of the visual corridor but are usually less.

Scenic Resources - The objective and subjective visual features of a unique and irreplaceable landscape, including rewarding views of vegetation, topography, geological formations and historical sites.

Seiche (Sash) - An occasional rhythmic oscillation of water above and below the mean level of lakes or landlocked seas, lasting from a few minutes to an hour or more. Earthquakes often cause seiches either directly, through ground shaking, or indirectly, through landslides.

Service Sector Employment - Jobs in the service sector of the economy, as opposed to the trade or goods producing sectors. Operationally, jobs classified by the Bureau of Labor Statistics as service, as well as those in the finance, insurance and real estate category comprise total service employment.

Sewerage - Facilities for the collection, transmission, or treatment of sewage or wastewater.

SO₂ - Sulfur dioxide.

Sound - See Acoustics (1).

Sound Insulation - (1) The use of structures and materials designed to reduce the transmission of sound from one room or area to another or from the exterior to the interior of a building. (2) The degree by which sound transmission is reduced by means of sound-insulating structures and materials.

Sound Level (Noise Level) - The weighted sound-pressure level obtained by use of a sound level meter having a standard frequency filter for attenuating part of the sound spectrum.

Sound Pressure - (1) The minute fluctuations in atmospheric pressure which accompany the passage of a sound wave; the pressure fluctuations on the tympanic membrane are transmitted to the inner ear and give rise to the sensation of audible sound. (2) For a steady sound, the value of the sound pressure averaged over a period of time. Sound pressure is usually measured (a) in dynes per square centimeter

(dyn/cm²), or (b) in newtons per square meter (N/m²). $1 \text{ N/m}^2 = 10 \text{ dyn/cm}^2 = 10^{-5}$ times the atmospheric pressure.

Specific Plan - A plan for the systematic implementation of the General Plan for all or part of the area covered by the General Plan. Established by the State Government Code Section 65450 op cit.

Spectrum - Of a sound wave, the description of its resolution into components, each of different frequency and (usually) different amplitude and phase.

Squad - Rescue truck containing rescue equipment and first aid supplies.

Stationary Source - A non-mobile emitter of air pollution.

Storle Index - A numerical rating system (0-100) of the degree to which a particular soil can grow plants or produce crops, based on four factors, including soil profile, surface texture, slope, and soil limitations.

Subdivision - The process (and the result) of dividing a parcel of raw land into smaller buildable sites, blocks, streets, open space, and public areas, and the designation of the location of utilities and other improvements.

Major Subdivision - Refers to a division of land which creates five or more parcels or lots.

Minor Subdivision - Refers to a division of land which creates fewer than five parcels or lots, except in certain circumstances.

Subsidence - The gradual, local settling or sinking of the earth's surface with little or no horizontal motion. Subsidence is usually the result of gas, oil, or water extraction, hydro-compaction or peat oxidation, not the result of a landslide or slope failure.

Surface Ruptures From Faulting - Breaks in the ground's surface and associated deformation resulting from the movement of a fault.

Surface Supply - Water in reservoirs, lakes, or streams; expressed either in terms of rate of flows (cubic feet per second) or volume (acre-feet).

T

Toxic and Hazardous Materials - Substances including pesticides, herbicides, toxic metals and chemicals, liquefied natural gas, explosives, volatile chemicals, and nuclear fuels.

Transient Sounds - Sounds whose average properties do not remain constant in time. Examples are an aircraft flyover, a passing truck, a sonic boom.

Transportation - Refers to the movement of people and goods.

Transportation Disadvantaged - Refers to those individuals who have difficulty in obtaining transportation because of their age, income, physical, or mental disability.

Transportation Facility - Refers to one or more transportation facilities that are planned, developed, operated, and maintained in a coordinated manner to supply continuity of movement between modes and within and between geographic and jurisdictional areas.

Tri-Valley Area - That area of the eastern San Francisco Bay Area, including the San Ramon, Dublin, and Livermore Valleys (portions of Alameda and Contra Costa county).

TSP - Total suspended particulates in the air.

U

Uncontrolled Access - No limit to the number of accesses to the roadway is established.

Usable Storage Capacity - The quantity of groundwater of acceptable quality that can be economically withdrawn from storage.

V

Vernal Pool - A shallow depression in poorly drained soil that fills with water during the rainy season, gradually shrinks in the spring, and usually dries out by summer. Often supports a unique population of organisms.

Visual Corridor - All areas visible from the highway (i.e., the view from the road).

Volume/Capacity Ratio, (V/C Ratio) - The ratio of volume of traffic to capacity for a road or road segment. The V/C ratios are useful to estimate levels of service and congestion.

W

Watershed - The total area above a given point on a stream that contributes water to its flow; the entire region drained by a waterway or which drains into a lake or reservoir.

Wavelength - For a periodic wave (such as sound in air), the perpendicular distance between analogous points on any two successive waves. The wavelength of sound in air or in water is inversely proportional to the frequency of the sound. Thus, the lower the frequency, the longer the wavelength.

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* Term began January 1, 1993.

** Term ended December 31, 1992.

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